10.0 SITE 8
BUILDING 114
PESTICIDE STORAGE AREA

10.1 SITE DESCRIPTION AND BACKGROUND

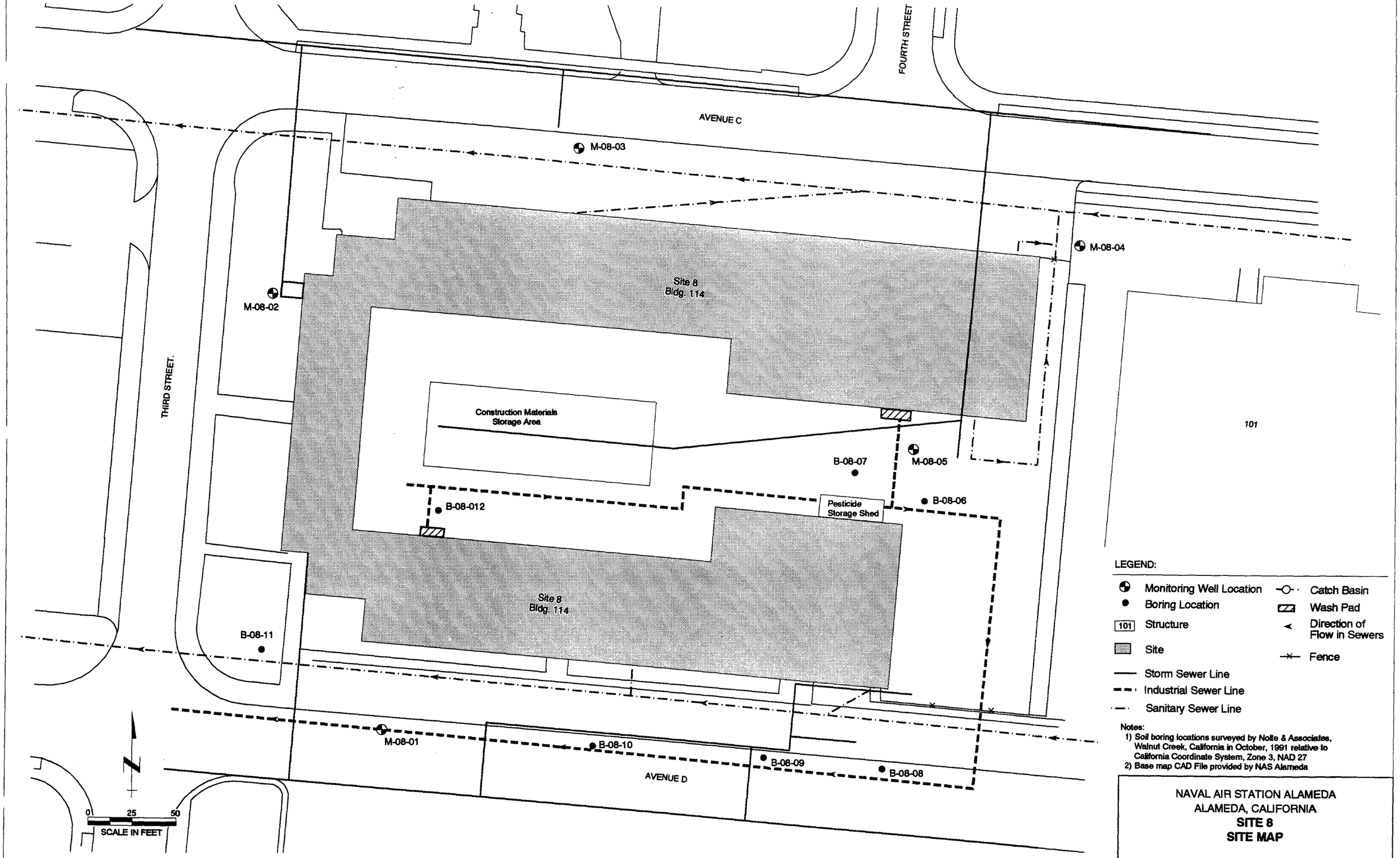
Site 8 consists of Building 114, which is located on Third Street between Avenues C and D, as shown on Figure 10-1. Prior to 1974, Site 8 was used as the center for weed and pest control on the base. The Public Works Center (PWC) stored material and rinsed equipment in the yard at Site 8. Pesticides stored there included chlordane, lindane, DDT, malathion, and diazinon. Herbicides stored there included Telvar, Chlorvar, 2,4-D, Roundup, Princep, and Krovar I. In 1974, PWC administrative duties were shifted to the Oakland Naval Supply Center; however pesticide operations remained at Building 114.

In addition to weed and pest control, PWC maintained other shops at Site 8. Activities at these shops included woodworking, painting, and steam cleaning. Steam cleaning, paint stripping, and paint spray booth activities generated approximately 250 gallons of wastewater per day, which was discharged directly to the storm drains. Ultimately, the drains emptied into the San Francisco Bay through the Sea Plane Lagoon. A separator pit located in the western corner of the courtyard was intended to separate sludges and floating scums from the wastewater stream; however, this system is known to have operated inadequately, sometimes allowing sludges and floating scum to remain in the wastewater stream (Canonie, 1990a).

Figure 10-1 shows the layout of the storm and industrial sewer lines at Site 8. Site 8 is connected to the industrial sewer system by a line that runs from the surface drains in the courtyard south to the main line under Avenue D. Sanitary sewer lines leave both the north and south sides of the building to connect with mains under Avenues C and D, respectively. The building is connected to the storm sewer system by a line that leaves the courtyard and runs north to connect with the main under Avenue C. Smaller storm sewer lines connect the roof downspouts with mains under both Avenues C and D.

10.2 CURRENT USE

Site 8 presently houses Navy and PWC administrative offices in the western half of Building 114 and PWC shops in the eastern half. PWC parks its vehicle fleet in the courtyard and along the southern side of Site 8. An outside shed along the northeast corner of the south wing of the building is used for storing pesticides. A number of maintenance activities, including a paint shop, are still in operation at the



Notes:
1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 8
SITE MAP

FIGURE 10-1

A-3

building. Building 191, located in the central courtyard of Building 114 is used to store construction supplies.

10.3 REMEDIAL INVESTIGATION

The purpose of the investigation at Site 8 was to determine if surface spills or leaks from the industrial sewer line had introduced contamination into surface or subsurface soils. The field investigation at Site 8 included borehole drilling, soil sampling, monitoring well construction, groundwater sampling, water level monitoring, and slug testing. Prior to final approval for the boring locations, JMM geophysicists surveyed the proposed locations to determine if there were underground utilities or other obstructions that could cause drilling problems. Twelve soil borings were drilled and groundwater monitoring wells were constructed in five of these borings. Methods used in the performance of these activities are described in Appendix A. Boring logs and well construction diagrams are included in Appendix C. Soil borings were drilled in the central courtyard area and around the perimeter of the building near the junction points in storm, sanitary, and industrial sewers that received effluent from activities at Site 8. The locations of soil borings and monitoring wells were surveyed and are shown in Figure 10-1. The rationale for the location of boring locations is presented in Canonie's work plan (1990a).

10.3.1 Site Geology/Hydrogeology

The sediments underlying Site 8 can be divided into two groups: fill material and native sediments. Geotechnical samples taken from the fill material indicate that the sediments consist of sands (SP) and silty sands (SM) (Table 10-1). Fill material consists dominantly of clean, fine-grained, well-sorted sand with high estimated hydraulic conductivity and ranges from 6.5 to 9.5 feet in thickness. Borings located in the street south of Site 8 have a layer of sandy gravel and gravelly sand beneath the asphalt (Figure 10-2). The gravelly material is found to a depth of approximately 2.5 feet and is interpreted to be part of the fill material used during road construction.

Native sediments at Site 8 are represented by layers of clay to sandy clay and clayey sand, as is shown in Figure 10-2 and 10-3. These units occur as discontinuous layers at depths of 9.5 to 13 feet below the ground surface. An odor similar to that associated with mothballs was present in soil samples that were collected from native sediments. This odor was present in the 14- to 15.5-foot interval of borings B08-01, B08-02, B08-05, B08-10, B08-11, and B08-12; and in the 12.5- to 14-foot interval of boring B08-06.

During drilling, groundwater was encountered at an average depth of 6 feet within the sandy fill material. Groundwater monitoring wells were constructed with screened intervals from 4 to 14 feet, across

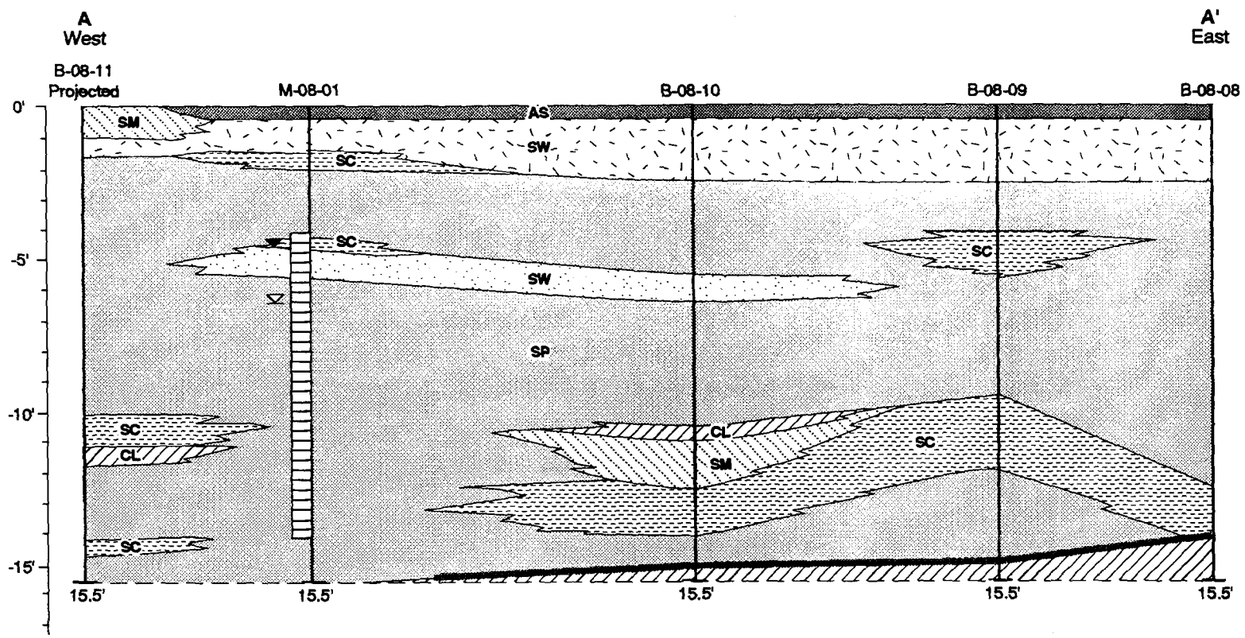
TABLE 10-1

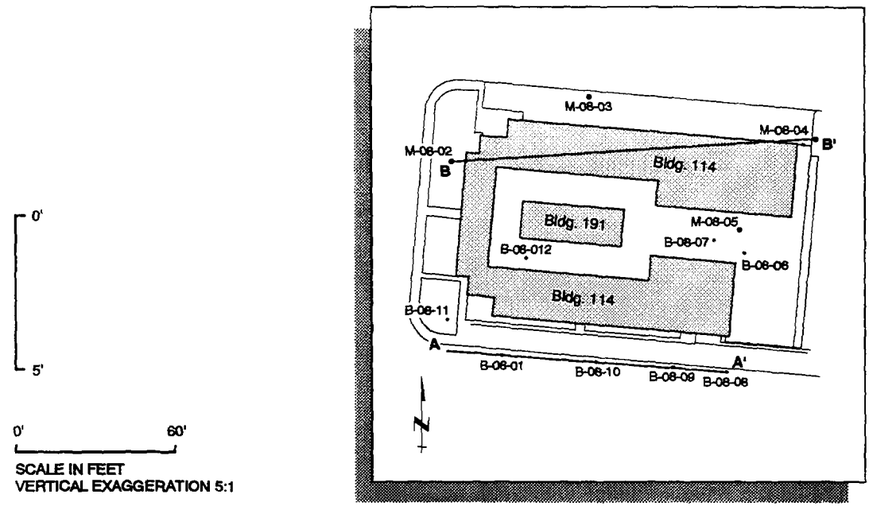
SITE 8
BUILDING 114
GEOTECHNICAL SAMPLE LABORATORY TEST RESULTS

Sample No.	Depth (ft)	Soil Classification Laboratory	Soil Classification Field	Moisture Content (%)	Dry Density (pcf)	Specific Gravity	CEC (meq/100g)	TOC (%w/w)	Permeability Effective Stresses (psi)	Permeability Hydraulic Conductivity (cm/s)
B-08-01	8.5-9	SM	SP	28.5	95.0	NA	10.2	< 0.1	NA	NA
B-08-02	12-12.5	SC	SC	NA	NA	NA	NA	< 0.1	NA	NA
B-08-03	4.5-5	SP	SP	NA	NA	NA	NA	NA	NA	NA
B-08-03	13-13.5	NA	CL	40.0	81.5	NA	NA	NA	7	7.13E-08
B-08-04	10-10.5	SP	SP	20.5	102.0	2.69	2.9	NA	NA	NA
B-08-04	13.5-14	CL	CL	NA	NA	NA	NA	NA	NA	NA
B-08-07	4-4.5	NA	SP	NA	NA	NA	NA	< 0.1	NA	NA
B-08-08	10.5-11	SM	SP	NA	NA	NA	18.4	NA	NA	NA
B-08-09	10-10.5	NA	SP	34.5	93.0	NA	NA	NA	6	2.71E-06

NA - Not Analyzed
Parameters not detectect are reported as less than method detection limit.

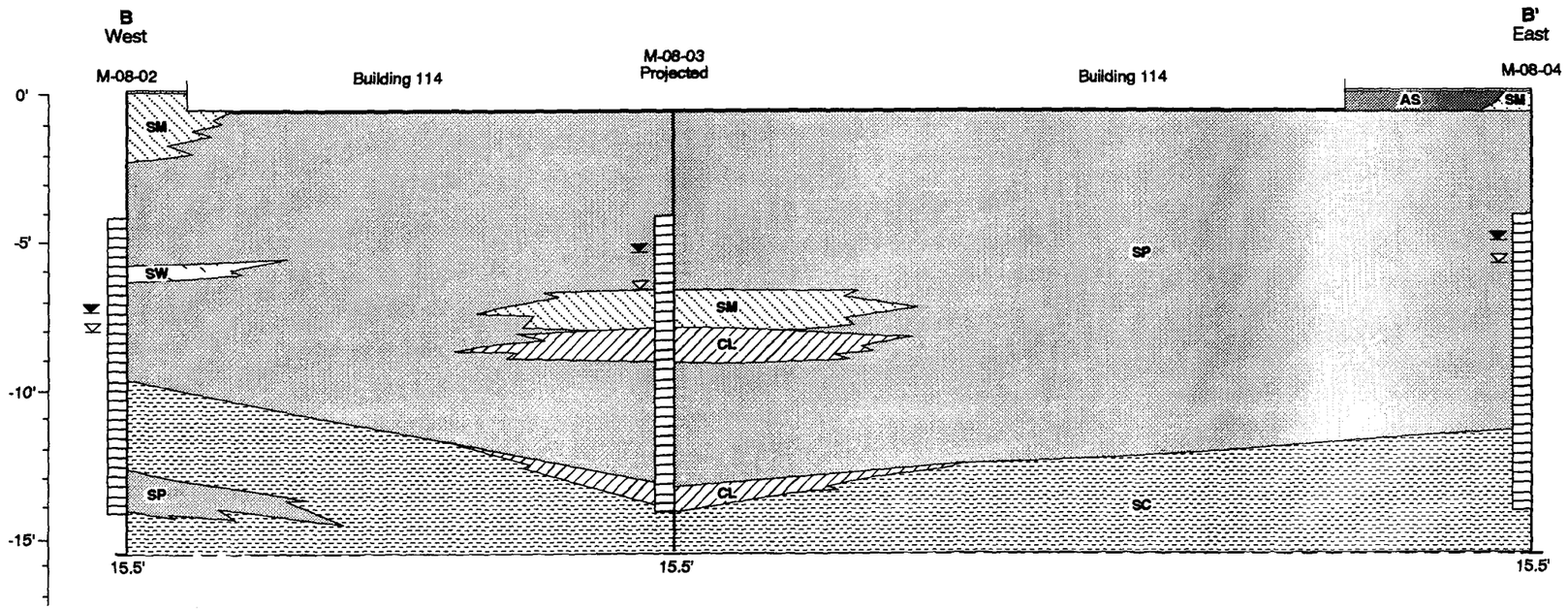
Laboratory Methods (Units):
- Soil Classification - Unified Soil Classification System (USCS) - ASTM D2488
- Moisture Content - ASTM D2216 (percent)
- Dry Density - ASTM D2937 (pounds per cubic foot)
- Specific Gravity - ASTM D854
- Cation Exchange Capacity (CEC) - EPA 9080 (milliequivalents per 100 grams)
- Total Organic Carbon (TOC) - Walkey and Black (percent of wet weight)
- Effective Stress - EPA 9100 (pounds per square inch)
- Hydraulic Conductivity - EPA 9100 (centimeters per second)





0' 60'

SCALE IN FEET
VERTICAL EXAGGERATION 5:1

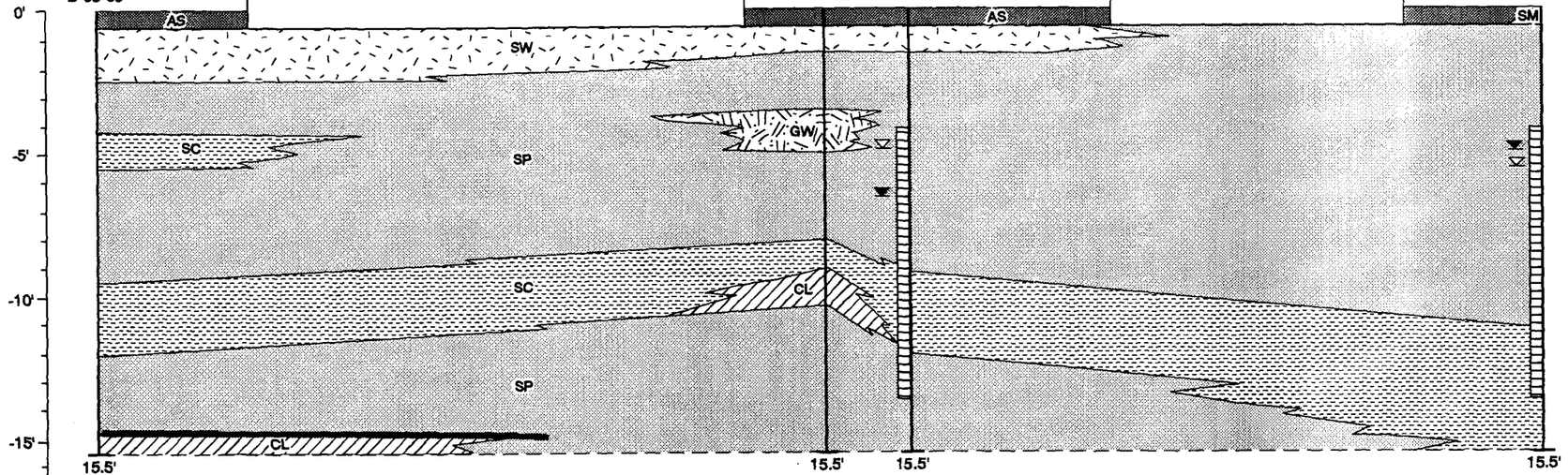


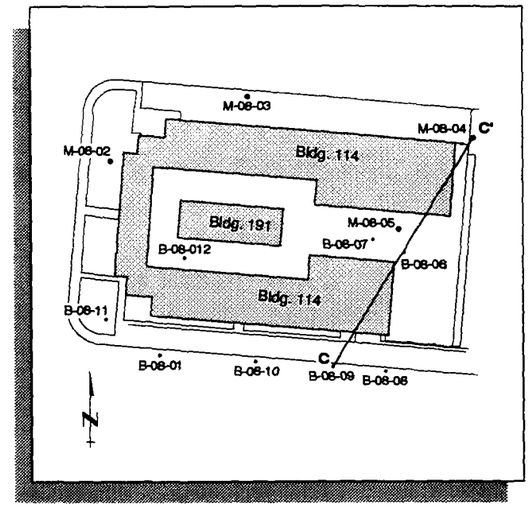
LEGEND:

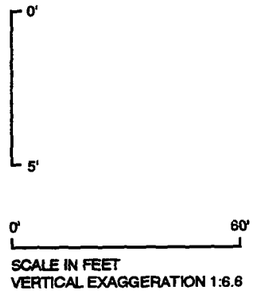
- SW Gravelly Sand
- SP Sand
- SM Silty Sand
- SC Clayey Sand
- CL Clay
- AS Asphalt
- Approximate Fill/Native Sediment Interface (Native material not encountered in Cross Section B-B')
- Monitoring Well
- Screened Interval
- First Water During Drilling
- Water Level During Water Sampling

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 8
GEOLOGIC CROSS SECTION A-A', B-B'

FIGURE 10-2







LEGEND:

- SW Gravelly Sand
- GW Sandy Gravel
- SP Sand
- SC Clayey Sand
- SM Silty Sand
- CL Clay
- AS Asphalt
- Approximate Fill/Native Sediment Interface
- First Water During Drilling
- Water Level During Water Sampling
- Monitoring Well
- Screened Interval

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 8
GEOLOGIC CROSS SECTION C-C'

FIGURE 10-3

A-4

the saturated portions of the sandy fill unit and the upper portions of the native sediments. In-situ permeability tests were conducted in the wells at Site 8. The hydraulic conductivities as determined by the rising-head method of Bouwer and Rice ranged from 1.2E-03 cm/sec to 2.6E-04 cm/sec (Bouwer and Rice, 1976; Bouwer, 1989). In-situ permeability test data are included in Appendix E.

Groundwater levels were monitored over a 3-month period at different times during the lunar cycle and at different times during the daily diurnal cycle. Data are summarized in Table 10-2. With the exception of well M08-01, water levels were fairly consistent. Based on these data, it does not appear that tidal fluctuations affect groundwater levels at the site. Groundwater potentiometric surface contours for September 3, 1991, are illustrated on Figure 10-4. Groundwater flows northward under a hydraulic gradient of 0.003 to 0.007 ft./ft.

10.3.2 Analytical Results - Soil Samples

Four soil samples (one surface and three subsurface) were analyzed from each of the 12 boreholes drilled in this investigation. The rationale for the selection of chemical analyses is presented in Canonie's work plan (1990a). Surface soil samples were analyzed for SVOCs, pesticides/PCBs, herbicides, and metals. Subsurface soil samples were analyzed for these constituents plus VOCs. Analytical results for VOCs, SVOCs, pesticides/PCBs, and herbicides are summarized in Table 10-3. Note that results are presented only for those analytes identified in soil samples. A complete list of the analytes potentially detected by these analyses is presented in Section 4.0. Analytical results for metals in soils are summarized in Table 10-4. Tables are located at the end of this section. Laboratory QC data are summarized in the QCSR, submitted under separate cover.

Selected samples were also analyzed for total organic carbon content (TOC) and soil pH. TOC and soil pH data will be used in the feasibility study portion of the project and are not discussed here. Analytical results for these parameters are summarized in Appendix B.

10.3.2.1 Volatile Organic Compounds. Acetone was found in 25 samples from various depths in all borings except B08-03 and B08-04. Because acetone was also present in laboratory method blanks, the data were qualified (Section 3.0). After data qualification, 15 of the samples are considered not detected and the remaining 10 must be considered valid detections. Qualified data are flagged in Table 10-3. No known source of acetone exists at the site.

Carbon disulfide was detected in boring B08-08 at a depth of 14 feet at a concentration of 25 µg/kg. Ethylbenzene and xylene were found in the 14-foot samples from borings B08-01 and B08-10, at

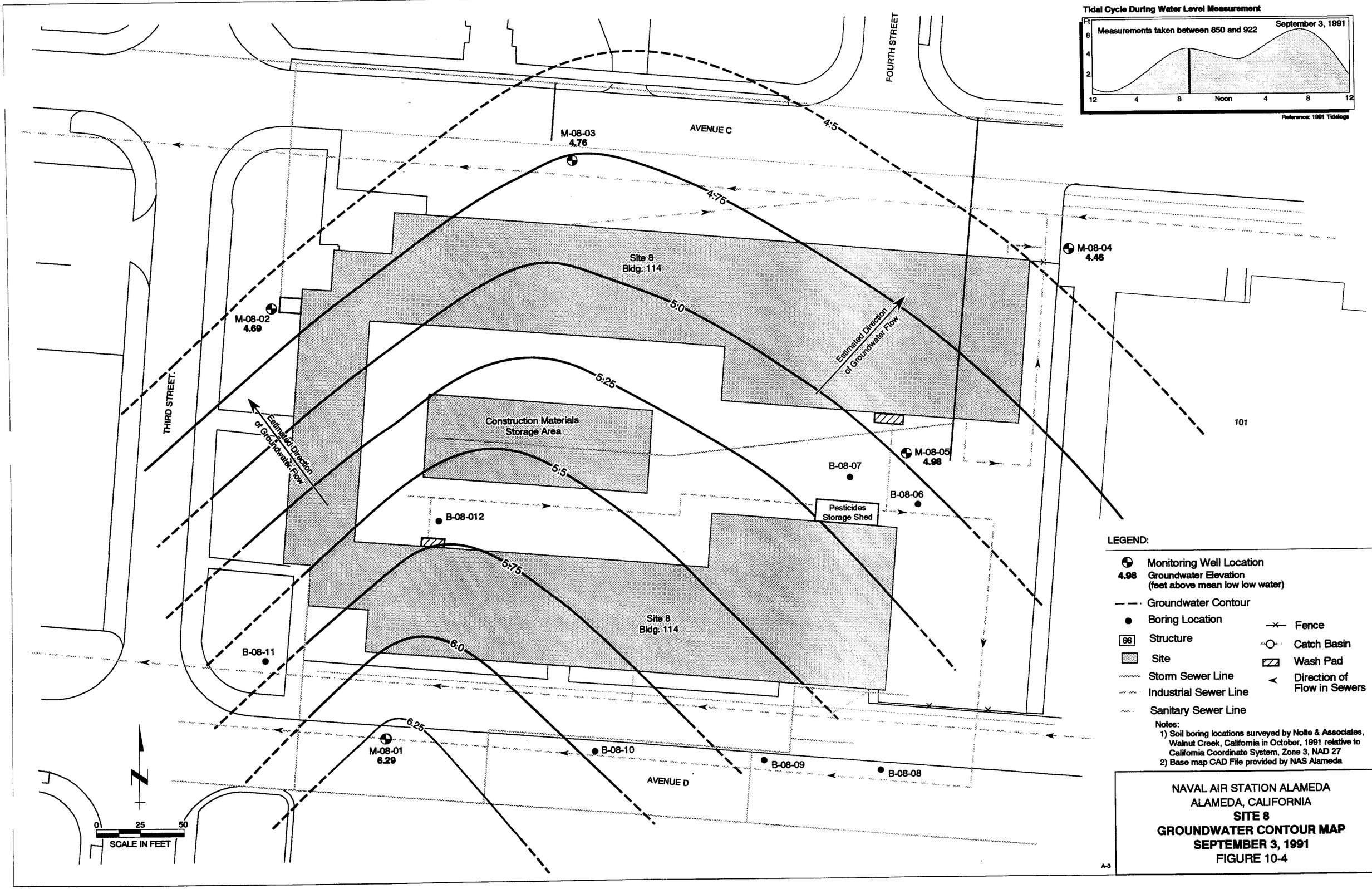

Tidal Cycle During Water Level Measurement
Ft
6
4
2
Measurements taken between 850 and 922
September 3, 1991
12
4
8
Noon
4
8
12
Reference: 1991 Tidelogs
FOURTH STREET
AVENUE C
M-08-03
4.76
4.5
4.75
M-08-04
4.46
Site 8
Bldg. 114
5.0
M-08-02
4.69
THIRD STREET
Estimated Direction of Groundwater Flow
5.25
Construction Materials Storage Area
M-08-05
4.98
B-08-07
B-08-06
5.5
Pesticides Storage Shed
B-08-012
5.75
Site 8
Bldg. 114
B-08-11
6.0
6.25
M-08-01
6.29
B-08-10
B-08-09
B-08-08
AVENUE D
101
0
25
50
SCALE IN FEET
LEGEND:
Monitoring Well Location
4.98 Groundwater Elevation (feet above mean low low water)
Groundwater Contour
Boring Location
66 Structure
Site
Storm Sewer Line
Industrial Sewer Line
Sanitary Sewer Line
Fence
Catch Basin
Wash Pad
Direction of Flow in Sewers
Notes:
1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda
NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 8
GROUNDWATER CONTOUR MAP
SEPTEMBER 3, 1991
FIGURE 10-4
A-3

TABLE 10-2

SITE 8
BUILDING 114
WATER LEVEL DATA

		Date	Time	Water Level in feet	Water Elevation in feet
M08-01					
ToC	*11.35*	9/3/91	850	5.06	6.29
		9/19/91	1416	5.10	6.25
		12/5/91	1041	6.69	4.66
		12/5/91	1204	6.69	4.66
M08-02					
ToC	*12.95*	9/3/91	850	8.28	4.67
		9/19/91	1501	8.35	4.60
		12/5/91	1044	8.60	4.35
		12/5/91	1145	8.60	4.35
M08-03					
ToC	*11.48*	9/3/91	922	6.72	4.76
		9/19/91	1253	6.75	4.73
		12/5/91	1036	6.93	4.55
		12/5/91	1147	6.93	4.55
M08-04					
ToC	*10.26*	9/3/91	913	5.80	4.46
		9/19/91	1352	5.85	4.41
		12/5/91	1037	6.11	4.15
		12/5/91	1153	6.11	4.15
M08-05					
ToC	*10.04*	9/3/91	850	5.06	4.98
		9/19/91	1416	5.10	4.94
		12/5/91	1039	5.32	4.72
		12/5/91	1200	5.32	4.72

ToC - Top of Casing
Elevation datum - USGS Mean Low Low Water

concentrations of 74 and 36 µg/kg, respectively. Borings B08-01 and B08-10 are located on the south side of Site 8. Methylene chloride was found in several borings at various depths with concentrations ranging from 5.4 to 10 µg/kg.

10.3.2.2 Semivolatile Organic Compounds. SVOCs were detected in most borings at Site 8. All of the SVOCs detected at Site 8 were of the polycyclic aromatic hydrocarbons class (PAH) except for bis (2-ethylhexyl) phthalate and di-n-butyl phthalate. Analytical results for SVOCs are included in Table 10-3.

PAH were detected at low levels in the fill material and at relatively higher levels in native sediments underlying the fill material. Concentrations ranged from 91 to 160,000 mg/kg. The highest concentrations were detected in the samples from 14 feet in borings B08-08 and B08-11 located on the southeast and southwest portions of the site, and in B08-04 on the north side of the site and B08-06 in the inner courtyard.

The phthalate compounds were detected at concentrations ranging from 120 µg/kg in the 2-foot sample from B08-02 to 8,600 µg/kg in the 14-foot sample from boring B08-06.

10.3.2.3 Pesticides/PCBs/Herbicides. The pesticides/herbicides 4,4'-DDE and -DDT, dicamba, diuron, dieldrin, endrin, MCPA, and MCPP were detected in soils at Site 8. Of the compounds detected, only MCPP and MCPA were present deeper than 2 feet.

2,4-D was detected in only the 8-foot sample from boring B08-06 at a concentration of 8.81 µg/kg. 4,4'-DDT was detected in only the surface samples from borings B08-02 and B08-04 at concentrations of 16.1 and 521 µg/kg, respectively. The breakdown product 4,4'-DDE was detected in the surface sample from B08-02 at a concentration of 7.86 µg/kg and in the surface sample from B08-04 at a concentration of 35 µg/kg. 4,4'-DDE was also detected in the surface sample duplicate from boring B08-01.

The pesticide Dicamba (Banvel) was detected in only one sample, the surface sample from boring B08-02, at a concentration of 50.6 µg/kg. Endrin ketone was also only identified in one sample, the surface sample from boring B08-01, at a concentration of 99.6 µg/kg. The pesticide diuron was detected in only the surface sample from boring B08-03 at a concentration of 303 µg/kg. Dieldrin, a herbicide, was identified in only the surface sample form B08-04 at a concentration of 52.6 µg/kg.

The pesticide MCPA was detected in two samples, the surface sample from boring B08-04 and the 14-foot sample from boring B08-09 at concentrations of 52.6 and 643, respectively. MCPP was detected in

nine samples at concentrations ranging from 445 to 1,030 µg/kg. The highest concentrations were identified in the 14-foot sample from boring B08-10 and the 2-foot and 5-foot samples from boring B08-07. Boring B08-10 is located south of the site, along Avenue D and B08-07 is located in the eastern portion of the inner courtyard, near the pesticide storage shed. The pesticide Monuron was detected in only the 14-foot sample from boring B08-10 at a concentration of 280 µg/kg.

The PCB Aroclor 1260 was detected in six samples and was generally present in surface samples. Detected concentrations ranged from 67 to 1,500 µg/kg. The highest concentration was detected in the surface soil sample from boring B08-04. This sample was collected from a grassy area on the northeast portion of Site 8.

10.3.2.4 Metals. As discussed in Section 3.0 of this report, background data for metals in soils at NAS Alameda have not been collected. Background data for metals in soil will be collected at a later date. An evaluation of the location and extent of possible metals contamination will be performed after the collection of background soil samples. Data generated in this investigation are presented below. As discussed in Section 3.0, the metals beryllium, chromium, copper, lead, mercury, and nickel have been tentatively identified as metals of concern. Analytical results for these metals are presented below. Results for all metals analyzed for are presented in Table 10-4.

Beryllium was detected in 50 samples at concentrations ranging from 0.149 to 1.33 mg/kg. The highest concentration was identified in the 14-foot sample from boring B08-08, located southwest of the site adjacent to Avenue D.

Total chromium was detected in 53 samples at concentrations ranging from 8.19 to 194 mg/kg. The highest concentration was detected in the surface sample of boring B08-04. Boring B08-04 is located near the northeast corner of the site.

Copper was detected in 53 samples at concentrations ranging from 3.45 to 85.5 mg/kg. The highest concentration was detected in the 14-foot sample from boring B08-12. Boring B08-12 is located in the southwestern portion of the interior courtyard.

Lead was detected 53 samples at concentrations ranging from 1.09 to 774 mg/kg. Mercury was detected in 17 samples at concentrations ranging from 0.071 to 0.532 mg/kg. The highest concentration of both metals was detected in the surface sample at boring B08-04, located near the northeast corner of the site.

Nickel was detected in 53 samples at concentrations ranging from 9.69 to 76.4 mg/kg. The highest concentration was detected in the 14-foot sample from boring B08-04.

10.3.3 Analytical Results - Groundwater Samples

Groundwater samples collected from five wells installed at Site 8 were analyzed for VOCs, SVOCs, pesticides/PCBs/herbicides, and metals. Analytical results for organic compounds detected in groundwater are summarized in Table 10-5. Note that this table contains results for only those analytes detected at the site. A complete list of analytes potentially detected by the laboratory method is presented in Section 4.0. Analytical results for metals are summarized in Table 10-6. Analytical results tables can be found at the end of this section. Due to laboratory error, the duplicate sample from well M08-03 was not analyzed for VOCs and SVOCs by ESE Laboratory. Laboratory QC data are summarized in the QCSR submitted under separate cover.

10.3.3.1 Volatile Organic Compounds. VOCs were detected in all wells except M08-04. Benzene was detected at concentrations ranging from 15 to 1.9 µg/kg. Ethylbenzene concentrations range from 13 to 2.7 µg/kg. Concentrations of total xylenes range from 3.7 to 2.1 µg/kg. The highest concentrations of these constituents were identified in well M08-01. 1,2-DCE was detected in only well M08-01 at a concentration of 7.9 µg/kg.

10.3.3.2 Semivolatile Organic Compounds. SVOCs were detected in groundwater samples collected from all wells except for well M08-04 (Table 10-5). The SVOCs are all classified as PAH. Concentrations of detected PAH range from 1.2 to 260 µg/kg.

10.3.3.3 Pesticides/PCBs/Herbicides. The pesticides Bromacil and diuron were detected in the groundwater sample from well M08-05 at concentrations of 10.2 and 1.3 µg/L, respectively.

10.3.3.4 Metals. Analytical results for metals in groundwater are summarized in Table 10-6. In general, the highest levels of metals were detected in samples from M08-04 and M08-05. Determination of whether levels of metals are elevated will be made at a later date when background data are available.

10.3.3.5 General Chemicals. Analytical results for general chemicals, pH, and TOC are summarized in Table 10-9. Groundwater conductivity was measured during sampling of the wells and ranged from 1,400 to 14,000 micro-ohms per centimeter. The groundwater is thus classified as brackish (Table 2-1; Driscoll, 1987). Groundwater pH values ranged from 7.00 to 8.00.

TABLE 10-3
NAS ALAMEDA - SITE 8
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B08-01-000	Duplicate B08-01-000	B08-01-004	B08-01-010	B08-01-014	B08-02-000	B08-02-002	B08-02-008	B08-02-014	B08-03-000	B08-03-002
Date Sampled	07/30/91	07/30/91	07/30/91	07/30/91	07/30/91	08/06/91	08/06/91	08/06/91	08/06/91	07/29/91	07/29/91
Depth of Sample	0.0 ft	0.0 ft	3.5 ft	9.5 ft	14.0 ft	0.0 ft	2.0 ft	8.0 ft	14.0 ft	0.0 ft	2.0 ft
PARAMETER REPORTED											
VOLATILE ORGANICS (µg/kg-dry)											
ACETONE	NA	NA	< 11	< 13	< 12	NA	< 10.0	41UJ	33UJ	NA	< 11
CARBON DISULFIDE	NA	NA	< 5.6	< 6.3	< 6.2	NA	< 5.2	< 5.9	< 6.6	NA	< 5.4
ETHYLBENZENE	NA	NA	< 5.6	< 6.3	74	NA	< 5.2	< 5.9	< 6.6	NA	< 5.4
METHYLENE CHLORIDE	NA	NA	7.3	6.8	< 6.2	NA	< 5.2	< 5.9	< 6.6	NA	< 5.4
XYLENE	NA	NA	< 5.6	< 6.3	23	NA	< 5.2	< 5.9	< 6.6	NA	< 5.4
PESTICIDES/PCBS (µg/kg-dry)											
4,4'-DDE	< 3.42	11.6	< 3.75	< 4.19	< 4.12	7.86	< 3.45	< 3.94	< 4.43	< 3.52	< 3.62
4,4'-DDT	< 6.83	< 6.83	< 7.49	< 8.38	< 8.23	16.1	< 6.91	< 7.87	< 8.87	< 7.05	< 7.23
Aroclor-1260	< 34	270	< 37	< 42	< 41	67	< 35	< 39	< 44	< 35	< 36
Dieldrin	< 3.42	< 3.42	< 3.75	< 4.19	< 4.12	< 3.45	< 3.45	< 3.94	< 4.43	< 3.52	< 3.62
Endrin ketone	< 6.83	99.6	< 7.49	< 8.38	< 8.23	< 6.91	< 6.91	< 7.87	< 8.87	< 7.05	< 7.23
MCPA	< 42.0	< 42.0	< 46.1	< 51.5	< 50.6	48.7	< 42.5	< 48.4	< 54.5	< 43.3	< 44.5
MCPP	< 42.0	< 42.0	< 46.1	< 51.5	< 50.6	< 42.5	< 42.5	< 48.4	< 54.5	< 43.3	< 44.5
ORGANOPHOSPHORUS PESTICIDES (µg/kg)	ND	NDUJ	ND	ND	ND	ND	ND	ND	ND	NDUJ	NDUJ
CARBAMATE/UREA PESTICIDES (ug/kg-dry)											
DIURON	< 258UJ	< 258UJ	< 258UJ	< 258UJ	< 258UJ	< 258	< 258	< 258	< 258	303J	< 258UJ
MONURON	< 260UJ	< 260UJ	< 260UJ	< 260UJ	< 260UJ	< 260	< 260	< 260	< 260	< 260UJ	< 260UJ
HERBICIDES (µg/kg-dry)											
2,4-D	< 2.05	< 2.05	< 2.25	< 2.51	< 2.47	< 2.07UJ	< 2.07UJ	< 2.36UJ	< 2.66UJ	< 2.11	< 2.17
DICAMBA (BANVEL)	< 2.05	< 2.05	< 2.25	< 2.51	< 2.47	50.6J	< 2.07UJ	< 2.36UJ	< 2.66UJ	< 2.11	< 2.17
SEMIVOLATILE ORGANICS (µg/kg-dry)											
2-METHYLNAPHTHALENE	1300J	< 1000UJ	< 110UJ	< 130UJ	< 1200UJ	< 100	< 100	< 120	220	< 110UJ	< 110UJ
ACENAPHTHENE	< 720UJ	< 720UJ	< 79UJ	< 88UJ	4600J	< 83	< 83	< 94	1000	< 74UJ	< 76UJ
ACENAPHTHYLENE	< 720UJ	< 720UJ	< 79UJ	< 88UJ	< 860UJ	< 83	< 83	< 94	< 110	< 74UJ	< 76UJ
ANTHRACENE	< 720UJ	< 720UJ	< 79UJ	< 88UJ	12000J	< 83	< 83	< 94	110	< 74UJ	< 76UJ
BENZO(A)ANTHRACENE	< 1000UJ	< 1000UJ	< 110UJ	< 130UJ	30000J	< 100	< 100	< 120	< 130	< 110UJ	< 110UJ
BENZO(A)PYRENE	< 1400UJ	< 1400UJ	< 160UJ	< 180UJ	< 1700UJ	< 150	< 150	< 170	< 190	< 150UJ	< 150UJ
BENZO(B)FLUORANTHENE	< 1000UJ	< 1000UJ	< 110UJ	< 130UJ	38000J	< 100	< 100	< 120	< 130	< 110UJ	< 110UJ
BENZO(GHI)PERYLENE	< 1600UJ	< 1600UJ	< 180UJ	< 200UJ	< 2000UJ	< 170	< 170	< 190	< 210	< 170UJ	< 170UJ
BENZO(K)FLUORANTHENE	< 1000UJ	< 1000UJ	< 110UJ	< 130UJ	< 1200UJ	< 100	< 100	< 120	< 130	< 110UJ	< 110UJ
BIS(2-ETHYLHEXYL)PHTHALATE	< 1000UJ	< 1000UJ	< 110UJ	< 130UJ	< 1200UJ	360	130	< 120	< 130	< 110UJ	< 110UJ
CHRYSENE	< 1000UJ	< 1000UJ	< 110UJ	< 130UJ	30000J	< 100	< 100	< 120	< 130	< 110UJ	< 110UJ
DI-N-BUTYL PHTHALATE	< 720UJ	< 720UJ	< 79UJ	< 88UJ	< 860UJ	< 83	< 83	< 94	< 110	< 74UJ	< 76UJ
DIBEN(A,H)ANTHRACENE	< 1600UJ	< 1600UJ	< 180UJ	< 200UJ	< 2000UJ	< 170	< 170	< 190	< 210	< 170UJ	< 170UJ
FLUORANTHENE	< 720UJ	< 720UJ	< 79UJ	< 88UJ	72000J	< 83	< 83	< 94	390	93J	< 76UJ
FLUORENE	< 720UJ	< 720UJ	< 79UJ	< 88UJ	12000J	< 83	< 83	< 94	180	< 74UJ	< 76UJ
INDENO(1,2,3-CD)PYRENE	< 160UJ	< 1600UJ	< 180UJ	< 200UJ	< 2000UJ	< 170	< 170	< 190	< 210	< 170UJ	< 170UJ
NAPHTHALENE	1700J	1100J	< 79UJ	< 88UJ	180000J	< 83	< 83	< 94	3900	< 74UJ	< 76UJ
PHENANTHRENE	1000J	< 720UJ	< 79UJ	< 88UJ	150000J	< 83	< 83	< 94	850	91J	< 76UJ
PYRENE	< 720UJ	< 720UJ	< 79UJ	< 88UJ	150000J	< 83	< 83	< 94	1200	150J	< 76UJ

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected
J = Qualified, estimated value
R = Qualified, not usable
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.

TABLE 10-3
NAS ALAMEDA - SITE 8
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B08-03-008	B08-03-014	B08-04-000	B08-04-002	B08-04-008	Redrill B08-04-008	B08-04-014	B08-05-000	B08-05-002	B08-05-008	Duplicate B08-05-008
Date Sampled	07/29/91	07/29/91	07/29/91	07/29/91	07/29/91	10/15/91	07/29/91	07/30/91	07/30/91	07/30/91	07/30/91
Depth of Sample	8.0 ft	14.0 ft	0.0 ft	2.0 ft	8.0 ft	8.0 ft	14.0 ft	0.0 ft	2.0 ft	8.0 ft	8.0 ft
PARAMETER REPORTED											
VOLATILE ORGANICS (µg/kg-dry)											
ACETONE	< 13	< 13	NA	< 11	< 13	NA	< 17	NA	11	19	< 12
CARBON DISULFIDE	< 6.3	< 6.6	NA	< 5.3	< 6.4	NA	< 8.3	NA	< 5.3	< 6.2	< 6.0
ETHYLBENZENE	< 6.3	< 6.6	NA	< 5.3	< 6.4	NA	< 8.3	NA	< 5.3	< 6.2	< 6.0
METHYLENE CHLORIDE	< 6.3	8.4	NA	5.4	7.4	NA	10.0	NA	< 5.3	6.7	< 6.0
XYLENE	< 6.3	< 6.6	NA	< 5.3	< 6.4	NA	< 8.3	NA	< 5.3	< 6.2	< 6.0
PESTICIDES/PCBS (µg/kg-dry)											
4,4'-DDE	< 4.20	< 4.40	35.0	< 3.57	< 4.28	NA	< 5.56	< 3.58	< 3.51	< 4.12	< 4.01
4,4'-DDT	< 8.40	< 8.81	521	< 7.13	< 8.56	NA	< 11.1	< 7.16	< 7.01	< 8.23	< 8.01
Aroclor-1260	< 42	< 44	1500	< 36	< 43	NA	< 56	< 36	< 35	< 41	< 40
Dieldrin	< 4.20	< 4.40	52.6	< 3.57	< 4.28	NA	< 5.56	< 3.58	< 3.51	< 4.12	< 4.01
Endrin ketone	< 8.40	< 8.81	< 6.99	< 7.13	< 8.56	NA	< 11.1	< 7.16	< 7.01	< 8.23	< 8.01
MCPA	< 51.6	< 54.2	< 43.0	< 43.9	< 52.6	NA	< 68.4	< 44.0	< 43.1	< 50.6	< 49.3
MCPP	< 51.6	< 54.2	< 43.0	< 43.9	< 52.6	NA	< 68.4	< 44.0	< 43.1	< 50.6	< 49.3
ORGANOPHOSPHORUS PESTICIDES (µg/kg)	NDUJ	NDUJ	NDUJ	NDUJ	NDUJ	NA	NDUJ	NDUJ	NDUJ	NDUJ	ND
CARBAMATE/UREA PESTICIDES (ug/kg-dry)											
DIURON	< 258UJ	< 258UJ	< 258UJ	< 258UJ	< 258UJ	NA	< 258UJ	< 258UJ	< 258UJ	< 258UJ	< 258UJ
MONURON	< 260UJ	< 260UJ	< 260UJ	< 260UJ	< 260UJ	NA	< 260UJ	< 260UJ	< 260UJ	< 260UJ	< 260UJ
HERBICIDES (µg/kg-dry)											
2,4-D	< 2.52	< 2.64	< 2.10	< 2.14	< 2.57	NA	< 3.34	< 2.15	< 2.10	< 2.47	< 2.40
DICAMBA (BANVEL)	< 2.52	< 2.64	< 2.10	< 2.14	< 2.57	NA	< 3.34	< 2.15	< 2.10	< 2.47	< 2.40
SEMIVOLATILE ORGANICS (µg/kg-dry)											
2-METHYLNAPHTHALENE	< 130UJ	< 1300UJ	< 100UJ	< 110UJ	NA	< 120	< 1700UJ	< 1100UJ	< 110UJ	< 120UJ	< 120UJ
ACENAPHTHENE	< 88UJ	< 920UJ	< 73UJ	< 75UJ	NA	< 100	2000J	< 750UJ	< 74UJ	< 86UJ	< 84UJ
ACENAPHTHYLENE	< 88UJ	< 920UJ	< 73UJ	< 75UJ	NA	< 100	< 1200UJ	< 750UJ	< 74UJ	< 86UJ	< 84UJ
ANTHRACENE	< 88UJ	< 920UJ	< 73UJ	< 75UJ	NA	< 100	< 1200UJ	< 750UJ	< 74UJ	< 86UJ	< 84UJ
BENZO(A)ANTHRACENE	< 130UJ	< 1300UJ	< 100UJ	< 110UJ	NA	< 120	6100J	< 1100UJ	< 110UJ	< 120UJ	< 120UJ
BENZO(A)PYRENE	< 180UJ	< 1800UJ	< 150UJ	< 150UJ	NA	< 170	< 2300UJ	< 1500UJ	< 150UJ	< 170UJ	< 170UJ
BENZO(B)FLUORANTHENE	< 130UJ	< 1300UJ	< 100UJ	< 110UJ	NA	< 120	10000J	< 1100UJ	< 110UJ	< 120UJ	< 120UJ
BENZO(GHI)PERYLENE	< 200UJ	< 2100UJ	< 170UJ	< 170UJ	NA	< 200	< 2700UJ	< 1700UJ	< 170UJ	< 200UJ	< 190UJ
BENZO(K)FLUORANTHENE	< 130UJ	< 1300UJ	< 100UJ	110J	NA	< 120	< 1700UJ	< 1100UJ	< 110UJ	< 120UJ	< 120UJ
BIS(2-ETHYLHEXYL)PHTHALATE	< 130UJ	< 1300UJ	4100J	< 110UJ	NA	260	< 1700UJ	< 1100UJ	< 110UJ	< 120UJ	< 120UJ
CHRYSENE	< 130UJ	< 1300UJ	< 100UJ	< 110UJ	NA	< 120	4800J	< 1100UJ	< 110UJ	< 120UJ	< 120UJ
DI-N-BUTYL PHTHALATE	< 88UJ	< 920UJ	2300J	< 75UJ	NA	< 100	< 1200UJ	< 750UJ	< 74UJ	< 86UJ	< 84UJ
DIBEN(A,H)ANTHRACENE	< 200UJ	< 2100UJ	< 170UJ	< 170UJ	NA	< 200	< 2700UJ	< 1700UJ	< 170UJ	< 200UJ	< 190UJ
FLUORANTHENE	< 88UJ	3000J	170J	210J	NA	< 100	12000J	< 750UJ	< 74UJ	< 86UJ	< 84UJ
FLUORENE	< 88UJ	< 920UJ	< 73UJ	< 75UJ	NA	< 100	< 1200UJ	< 750UJ	< 74UJ	< 86UJ	< 84UJ
INDENO(1,2,3-CD)PYRENE	< 200UJ	< 2100UJ	< 170UJ	< 170UJ	NA	< 200	< 2700UJ	< 1700UJ	< 170UJ	< 200UJ	< 190UJ
NAPHTHALENE	< 88UJ	1800J	< 73UJ	< 75UJ	NA	< 100	1800J	< 750UJ	< 74UJ	< 86UJ	< 84UJ
PHENANTHRENE	< 88UJ	1000J	91J	< 75UJ	NA	< 100	7700J	< 750UJ	< 74UJ	< 86UJ	< 84UJ
PYRENE	< 88UJ	5300J	200J	540J	NA	< 100	38000J	< 750UJ	< 74UJ	< 86UJ	< 84UJ

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected
J = Qualified, estimated value
R = Qualified, not usable
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.

TABLE 10-3
NAS ALAMEDA - SITE 8
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B08-05-014	B08-06-000	B08-06-004	B08-06-008	B08-06-014	B08-07-000	B08-07-002	B08-07-005	B08-07-013	B08-07-013	B08-08-000
Date Sampled	07/30/91	08/07/91	08/07/91	08/07/91	08/07/91	08/13/91	08/13/91	08/13/91	08/13/91	08/13/91	08/06/91
Depth of Sample	14.0 ft	0.0 ft	3.5 ft	8.0 ft	14.0 ft	0.0 ft	2.0 ft	5.0 ft	14.0 ft	12.5 ft	0.0 ft
PARAMETER REPORTED											
VOLATILE ORGANICS (µg/kg-dry)											
ACETONE	< 12	NA	< 11	15UJ	49UJ	NA	< 10.0	14	24	16	NA
CARBON DISULFIDE	< 6.0	NA	< 5.5	< 7.3	< 6.0	NA	< 5.2	< 6.0	< 5.9	< 6.0	NA
ETHYLBENZENE	< 6.0	NA	< 5.5	< 7.3	< 6.0	NA	< 5.2	< 6.0	< 5.9	< 6.0	NA
METHYLENE CHLORIDE	< 6.0	NA	< 5.5	< 7.3	< 6.0	NA	< 5.2	< 6.0	< 5.9	< 6.0	NA
XYLENE	< 6.0	NA	< 5.5	< 7.3	< 6.0	NA	< 5.2	< 6.0	< 5.9	< 6.0	NA
PESTICIDES/PCBS (µg/kg-dry)											
4,4'-DDE	< 3.98	< 35.6	< 3.67	< 4.84	< 3.99	< 3.65	< 3.49	< 4.03	< 3.94	< 4.02	< 34.4
4,4'-DDT	< 7.96	< 71.2	< 7.33	< 9.69	< 7.98	< 7.30	< 6.98	< 8.05	< 7.89	< 8.03	< 68.8
Aroclor-1260	< 40	< 360	< 37	< 48	< 40	< 37	< 35	< 40	< 39	< 40	< 340
Dieldrin	< 3.98	< 35.6	< 3.67	< 4.84	< 3.99	< 3.65	< 3.49	< 4.03	< 3.94	< 4.02	< 34.4
Endrin ketone	< 7.96	< 71.2	< 7.33	< 9.69	< 7.98	< 7.30	< 6.98	< 8.05	< 7.89	< 8.03	< 68.8
MCPA	< 48.9	< 43.8	< 45.1	< 59.6	< 49.1	< 44.9	< 42.9	< 49.5	< 48.5	< 49.4	< 42.3
MCPP	< 48.9	< 43.8	< 45.1	< 59.6	< 49.1	< 44.9	836	683	< 48.5	< 49.4	< 42.3
ORGANOPHOSPHORUS PESTICIDES (µg/kg)	NDUJ	NDUJ	NDUJ	NDUJ	NDUJ	ND	ND	ND	ND	ND	NDUJ
CARBAMATE/UREA PESTICIDES (ug/kg-dry)											
DIURON	< 258UJ	< 258	< 258	< 258	< 258	< 258UJ	< 258UJ	< 258UJ	< 258UJ	< 258UJ	< 258
MONURON	< 260UJ	< 260	< 260	< 260	< 260	< 260UJ	< 260UJ	< 260UJ	< 260UJ	< 260UJ	< 260
HERBICIDES (µg/kg-dry)											
2,4-D	< 2.39	< 2.14UJ	< 2.20UJ	8.8UJ	< 2.40UJ	< 2.19	< 2.09	< 2.42	< 2.37	< 2.41	< 2.06UJ
DICAMBA (BANVEL)	< 2.39	< 2.14UJ	< 2.20UJ	< 2.91UJ	< 2.40UJ	< 2.19	< 2.09	< 2.42	< 2.37	< 2.41	< 2.06UJ
SEMIVOLATILE ORGANICS (µg/kg-dry)											
2-METHYLNAPHTHALENE	< 120UJ	< 530	< 110	< 150	130	< 110	< 100	< 120	< 120	< 120	630
ACENAPHTHENE	360J	< 430	< 88	< 120	610	< 88	< 84	< 97	< 95	< 96	< 410
ACENAPHTHYLENE	< 84UJ	< 430	< 88	< 120	220	< 88	< 84	< 97	< 95	< 96	< 410
ANTHRACENE	< 84UJ	< 430	< 88	< 120	560	< 88	< 84	< 97	< 95	170J	< 410
BENZO(A)ANTHRACENE	< 120UJ	< 530	< 110	< 150	1000	< 110	< 100	< 120	< 120	440J	< 520
BENZO(A)PYRENE	< 170UJ	< 750	< 150	< 200	1500	< 150	< 150	< 170	< 170	720J	< 720
BENZO(B)FLUORANTHENE	< 120UJ	< 530	< 110	< 150	1400	< 110	< 100	< 120	< 120	430J	< 520
BENZO(GHI)PERYLENE	< 190UJ	< 850	< 180	< 230	< 190	< 180	< 170	< 190	< 190	530J	< 830
BENZO(K)FLUORANTHENE	< 120UJ	< 530	< 110	< 150	410	< 110	< 100	< 120	< 120	420J	< 520
BIS(2-ETHYLHEXYL)PHTHALATE	< 120UJ	640	< 110	< 150	8600	< 110	< 100	< 120	< 120	< 120	< 520
CHRYSENE	< 120UJ	< 530	< 110	< 150	1200	< 110	< 100	< 120	< 120	530J	600
DI-N-BUTYL PHTHALATE	< 84UJ	< 430	< 88	< 120	< 96	< 88	< 84	< 97	< 95	< 96	< 410
DIBEN(A,H)ANTHRACENE	< 190UJ	< 850	< 180	< 230	< 190	< 180	< 170	< 190	< 190	< 190	< 830
FLUORANTHENE	640J	< 430	< 88	< 120	3400	< 88	< 84	< 97	< 95	1200J	< 410
FLUORENE	< 84UJ	< 430	< 88	< 120	130	< 88	< 84	< 97	< 95	< 96	< 410
INDENO(1,2,3-CD)PYRENE	< 190UJ	< 850	< 180	< 230	< 190	< 180	< 170	< 190	< 190	350J	< 830
NAPHTHALENE	440J	< 430	< 88	< 120	2000	< 88	< 84	< 97	< 95	< 96	590
PHENANTHRENE	660J	< 430	< 88	< 120	2500	< 88	< 84	< 97	< 95	700J	440
PYRENE	1200J	< 430	< 88	< 120	2900	< 88	< 84	< 97	< 95	1800J	< 410

Notes: NA = Not analyzed
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R = Qualified, not usable
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.

TABLE 10-3
NAS ALAMEDA - SITE 8
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B08-08-002	B08-08-008	B08-08-014	Duplicate B08-08-014	B08-09-000	B08-09-005	B08-09-008	B08-09-014	Duplicate B08-09-014	B08-10-000	B08-10-005
Date Sampled	08/06/91	08/06/91	08/06/91	08/06/91	08/07/91	08/07/91	08/07/91	08/07/91	08/07/91	08/07/91	08/07/91
Depth of Sample	2.0 ft	8.0 ft	14.0 ft	14.0 ft	0.0 ft	5.0 ft	8.0 ft	14.0 ft	14.0 ft	0.0 ft	5.0 ft
PARAMETER REPORTED											
VOLATILE ORGANICS (µg/kg-dry)											
ACETONE	19UJ	46UJ	50UJ	39	NA	18UJ	26UJ	40UJ	72UJ	NA	20UJ
CARBON DISULFIDE	< 5.4	< 6.1	21	< 7.5	NA	< 5.6	< 5.9	< 6.0	< 7.0	NA	< 5.6
ETHYLBENZENE	< 5.4	< 6.1	< 8.0	< 7.5	NA	< 5.6	< 5.9	< 6.0	8.0	NA	< 5.6
METHYLENE CHLORIDE	< 5.4	< 6.1	< 8.0	< 7.5	NA	< 5.6	< 5.9	< 6.0	< 7.0	NA	< 5.6
XYLENE	< 5.4	< 6.1	< 8.0	< 7.5	NA	< 5.6	< 5.9	< 6.0	< 7.0	NA	< 5.6
PESTICIDES/PCBS (µg/kg-dry)											
4,4'-DDE	< 3.57	< 4.07	< 53.1	< 4.98	< 35.1	< 3.71	< 3.95	< 3.99	< 46.7	< 3.49	< 3.75
4,4'-DDT	< 7.15	< 8.15	< 106	< 9.97	< 70.2	< 7.42	< 7.90	< 7.98	< 93.4	< 6.99	< 7.51
Aroclor-1260	< 36	< 41	< 530	260	< 350	< 37	< 39	< 40	< 470	< 35	< 38
Dieldrin	< 3.57	< 4.07	< 53.1	< 4.98	< 35.1	< 3.71	< 3.95	< 3.99	< 46.7	< 3.49	< 3.75
Endrin ketone	< 7.15	< 8.15	< 106	< 9.97	< 70.2	< 7.42	< 7.90	< 7.98	< 93.4	< 6.99	< 7.51
MCPA	< 43.9	< 50.1	< 65.3	< 61.3	< 43.2	< 45.7	< 48.6	< 49.1	643	< 43.0	< 46.2
MCPP	< 43.9	< 50.1	< 65.3	< 61.3	< 43.2	< 45.7	< 48.6	< 49.1	< 57.4	< 43.0	660
ORGANOPHOSPHORUS PESTICIDES (µg/kg)	NDUJ	NDUJ	ND	ND	ND	ND	ND	ND	ND	ND	ND
CARBAMATE/UREA PESTICIDES (ug/kg-dry)											
DIURON	< 258	< 258	< 258	< 258	< 258	< 258	< 258	< 258UJ	< 258UJ	< 258UJ	< 258UJ
MONURON	< 260	< 260	< 260	< 260	< 260	< 260	< 260	< 260UJ	< 260UJ	< 260UJ	< 260UJ
HERBICIDES (µg/kg-dry)											
2,4-D	< 2.14UJ	< 2.44UJ	< 3.18UJ	< 2.99UJ	< 2.11UJ	< 2.23UJ	< 2.37UJ	< 2.40UJ	< 2.80UJ	< 2.10	< 2.25
DICAMBA (BANVEL)	< 2.14UJ	< 2.44UJ	< 3.18UJ	< 2.99UJ	< 2.11UJ	< 2.23UJ	< 2.37UJ	< 2.40UJ	< 2.80UJ	< 2.10	< 2.25
SEMIVOLATILE ORGANICS (µg/kg-dry)											
2-METHYLNAPHTHALENE	< 110	< 120	< 1600	< 750	< 530	< 110	< 120	< 600	< 1400	740	< 110
ACENAPHTHENE	< 86	< 98	42000	3100	< 420	< 89	< 95	8800	33000	< 420	< 90
ACENAPHTHYLENE	< 86	< 98	11000	< 600	< 420	< 89	< 95	730	2800	< 420	< 90
ANTHRACENE	< 86	< 98	47000	2300	< 420	< 89	< 95	6800	20000	< 420	< 90
BENZO(A)ANTHRACENE	< 110	< 120	65000	4100	< 530	< 110	< 120	7000	21000	< 520	< 110
BENZO(A)PYRENE	< 150	< 170	130000	6100	< 740	< 160	< 170	11000	39000	< 730	< 160
BENZO(B)FLUORANTHENE	< 110	< 120	130000	6200	< 530	< 110	< 120	11000	43000	< 520	< 110
BENZO(GHI)PERYLENE	< 170	< 200	140000	< 1200	< 840	< 180	< 190	< 960	48000	< 840	< 180
BENZO(K)FLUORANTHENE	< 110	< 120	27000	2200	< 530	< 110	< 120	3600	14000	< 520	< 110
BIS(2-ETHYLHEXYL)PHTHALATE	120	200	< 1600	< 750	< 530	140	390	< 600	< 1400	< 520	230
CHRYSENE	< 110	< 120	66000	4500	< 530	< 110	< 120	8000	24000	< 520	< 110
DI-N-BUTYL PHTHALATE	< 86	< 98	< 1300	< 600	< 420	< 89	< 95	< 480	< 1100	< 420	< 90
DIBEN(A,H)ANTHRACENE	< 170	< 200	< 2500	< 1200	< 840	< 180	< 190	< 960	< 2200	< 840	< 180
FLUORANTHENE	< 86	< 98	160000	15000	< 420	< 89	< 95	27000	74000	< 420	< 90
FLUORENE	< 86	< 98	2900	< 600	< 420	< 89	< 95	980	3200	< 420	< 90
INDENO(1,2,3-CD)PYRENE	< 170	< 200	76000	< 1200	< 840	< 180	< 190	< 960	32000	< 840	< 180
NAPHTHALENE	< 86	< 98	9000	1200	< 420	< 89	< 95	1100	3800	1200	< 90
PHENANTHRENE	< 86	< 98	150000	10000	< 420	< 89	< 95	31000	77000	< 420	< 90
PYRENE	< 86	< 98	150000	16000	< 420	< 89	< 95	21000	58000	< 420	< 90

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected
J = Qualified, estimated value
R = Qualified, not usable
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.

TABLE 10-3
NAS ALAMEDA - SITE 8
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B08-10-008	B08-10-014	B08-11-000	B08-11-004	B08-11-010	B08-11-014	B08-12-000	B08-12-005	B08-12-008	B08-12-014
Date Sampled	08/07/91	08/07/91	07/30/91	07/30/91	07/30/91	07/30/91	08/13/91	08/13/91	08/13/91	08/13/91
Depth of Sample	8.0 ft	14.0 ft	0.0 ft	4.0 ft	9.5 ft	14.0 ft	0.0 ft	5.0 ft	8.0 ft	14.0 ft
PARAMETER REPORTED										
VOLATILE ORGANICS (µg/kg-dry)										
ACETONE	15UJ	60UJ	NA	14	15	21	NA	< 11	13	18
CARBON DISULFIDE	< 5.8	< 6.0	NA	< 5.5	< 6.4	< 6.2	NA	< 5.4	< 6.0	< 6.1
ETHYLBENZENE	< 5.8	36	NA	< 5.5	< 6.4	< 6.2	NA	< 5.4	< 6.0	< 6.1
METHYLENE CHLORIDE	< 5.8	< 6.0	NA	6.5	7.8	< 6.2	NA	< 5.4	< 6.0	< 6.1
XYLENE	< 5.8	14	NA	< 5.5	< 6.4	< 6.2	NA	< 5.4	< 6.0	< 6.1
PESTICIDES/PCBS (µg/kg-dry)										
4,4'-DDE	< 3.89	< 4.02	< 3.57	< 3.64	< 4.24	< 4.16	< 3.62	< 3.62	< 3.98	< 4.04
4,4'-DDT	< 7.78	< 8.04	< 7.13	< 7.28	< 8.48	< 8.31	< 7.23	< 7.25	< 7.96	< 8.08
Aroclor-1260	< 39	< 40	240	< 36	< 42	< 42	160	< 36	< 40	< 40
Dieldrin	< 3.89	< 4.02	< 3.57	< 3.64	< 4.24	< 4.16	< 3.62	< 3.62	< 3.98	< 4.04
Endrin ketone	< 7.78	< 8.04	< 7.13	< 7.28	< 8.48	< 8.31	< 7.23	< 7.25	< 7.96	< 8.08
MCPA	< 47.8	< 49.5	< 43.9	< 44.8	< 52.2	< 51.1	< 44.5	< 44.6	< 48.9	< 49.7
MCPP	504	1030	< 43.9	< 44.8	< 52.2	< 51.1	455	445	788	549
ORGANOPHOSPHORUS PESTICIDES (µg/kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CARBAMATE/UREA PESTICIDES (ug/kg-dry)										
DIURON	< 258UJ	< 258UJ	< 258UJ	< 258UJ	< 258	< 258	< 258UJ	< 260UJ	< 260UJ	< 260UJ
MONURON	< 260UJ	280UJ	< 260UJ	< 260UJ	< 260	< 260	< 260UJ	< 260UJ	< 260UJ	< 260UJ
HERBICIDES (µg/kg-dry)										
2,4-D	< 2.33	< 2.41	< 2.14	< 2.18	< 2.54UJ	< 2.49UJ	< 2.17	< 2.17	< 2.39	< 2.42
DICAMBA (BANVEL)	< 2.33	< 2.41	< 2.14	< 2.18	< 2.54UJ	< 2.49UJ	< 2.17	< 2.17	< 2.39	< 2.42
SEMIVOLATILE ORGANICS (µg/kg-dry)										
2-METHYLNAPHTHALENE	< 120	330	< 110UJ	< 110UJ	< 130	< 2500	< 1100	< 110	< 120	< 120
ACENAPHTHENE	< 93	1600	< 75UJ	< 76UJ	< 100	21000	< 870	< 87	< 95	< 97
ACENAPHTHYLENE	< 93	680	< 75UJ	< 76UJ	< 100	7400	< 870	< 87	< 95	< 97
ANTHRACENE	< 93	1300	< 75UJ	< 76UJ	< 100	37000	< 870	< 87	< 95	< 97
BENZO(A)ANTHRACENE	< 120	1800	< 110UJ	< 110UJ	< 130	51000	< 1100	< 110	< 120	< 120
BENZO(A)PYRENE	< 160	2300	< 150UJ	< 150UJ	< 180	68000	< 1500	< 150	< 170	< 170
BENZO(B)FLUORANTHENE	< 120	2000	< 110UJ	< 110UJ	< 130	40000	< 1100	< 110	< 120	< 120
BENZO(GHI)PERYLENE	< 190	2100	< 170UJ	< 170UJ	< 200	51000	< 1700	< 170	< 190	< 190
BENZO(K)FLUORANTHENE	< 120	610	< 110UJ	< 110UJ	< 130	39000	< 1100	< 110	< 120	< 120
BIS(2-ETHYLHEXYL)PHTHALATE	< 120	290	400J	< 110UJ	150	< 2500	< 1100	< 110	< 120	< 120
CHRYSENE	< 120	2100	< 110UJ	< 110UJ	< 130	56000	< 1100	< 110	< 120	< 120
DI-N-BUTYL PHTHALATE	< 93	< 97	< 75UJ	< 76UJ	< 100	< 2000	< 870	< 87	< 95	< 97
DIBEN(A,H)ANTHRACENE	< 190	240	< 170UJ	< 170UJ	< 200	< 4000	< 1700	< 170	< 190	< 190
FLUORANTHENE	< 93	4800	< 75UJ	< 76UJ	< 100	130000	< 870	< 87	< 95	150J
FLUORENE	< 93	470	< 75UJ	< 76UJ	< 100	12000	< 870	< 87	< 95	< 97
INDENO(1,2,3-CD)PYRENE	< 190	1800	< 170UJ	< 170UJ	< 200	40000	< 1700	< 170	< 190	< 190
NAPHTHALENE	< 93	4300	< 75UJ	< 76UJ	< 100	13000	< 870	< 87	< 95	< 97
PHENANTHRENE	< 93	6400	< 75UJ	< 76UJ	< 100	170000	< 870	< 87	< 95	< 97
PYRENE	< 93	6400	< 75UJ	< 76UJ	< 100	170000	< 870	< 87	< 95	250J

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected
J = Qualified, estimated value
R = Qualified, not usable
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.

TABLE 10-4
NAS ALAMEDA - SITE 8
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B08-01-000	Duplicate B08-01-000	B08-01-004	B08-01-010	B08-01-014	B08-02-000	B08-02-002	B08-02-008
Date Sampled	07/30/91	07/30/91	07/30/91	07/30/91	07/30/91	08/06/91	08/06/91	08/06/91
Depth of Sample	0.0 ft	0.0 ft	3.5 ft	9.5 ft	14.0 ft	0.0 ft	2.0 ft	8.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	7840J	9450J	5460J	4230J	4910J	5190J	4580J	4120J
ANTIMONY	3.8J	3.2J	3.3J	< 2.6UJ	< 3.1UJ	< 2.5UJ	< 2.3UJ	< 2.7UJ
ARSENIC	2.25	1.79	1.52	1.71	1.52	2.19J	1.43J	1.55J
BARIUM	97.3J	78.6J	38.0J	34.8J	27.2J	91.6J	42.4J	84.3J
BERYLLIUM	0.216	0.626	0.627	0.422	0.223	0.621	0.614	0.344
CADMIUM	< 0.287	< 0.256	< 0.328	< 0.317	< 0.365	0.960	< 0.271	< 0.320
CALCIUM	3440J	5060J	2000J	1400J	2460J	2370J	2610J	2370J
CHROMIUM, TOTAL	30.2J	35.7J	27.8J	26.4J	33.1J	67.1	30.6	29.2
COBALT	10.2	10.3	5.31	4.89	5.37	4.92	4.68	4.35
COPPER	23.3J	23.3J	6.36J	5.42J	4.30J	21.1	4.71	4.74
IRON	15200J	16900J	9260J	8110J	7980J	8320J	7750J	7340J
LEAD	25.8	31.8	1.93	2.47	3.27	111J	1.52J	1.95J
MAGNESIUM	6720	7670	2860	2350	2300	1630J	2000J	1730J
MANGANESE	623J	401J	102J	80.7J	104J	215J	92.7J	75.3J
MERCURY	< 0.049	< 0.051	< 0.056	< 0.062	< 0.055	0.223	0.111	0.166
NICKEL	50.6J	49.8J	28.1J	26.5J	24.5J	20.9J	23.4J	20.4J
POTASSIUM	875J	938J	858J	775J	765J	602	555	595
SELENIUM	< 0.203UJ	< 0.211UJ	< 0.226UJ	< 0.243UJ	< 0.221UJ	< 0.210UJ	< 0.215UJ	< 0.241UJ
SILVER	0.544	0.552	< 0.535	0.528	0.679	0.978	0.473	< 0.523
SODIUM	402J	388J	506J	645J	1370J	253	240	278
THALLIUM	< 0.260	< 0.272	< 0.291	< 0.313	< 0.284	< 0.270	< 0.277	< 0.310
VANADIUM	25.1J	30.7J	22.1J	18.4J	24.3J	23	22	19
ZINC	33.2J	36.6J	24.1J	17.9J	17.7J	101J	15.6J	14.4J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 10-4
NAS ALAMEDA - SITE 8
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B08-02-014	B08-03-000	B08-03-002	B08-03-008	B08-03-014	B08-04-000	B08-04-002	B08-04-008
Date Sampled	08/06/91	07/29/91	07/29/91	07/29/91	07/29/91	07/29/91	07/29/91	07/29/91
Depth of Sample	14.0 ft	0.0 ft	2.0 ft	8.0 ft	14.0 ft	0.0 ft	2.0 ft	8.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	5160J	4990J	4630J	5890J	12700J	7000J	5880J	4300J
ANTIMONY	< 3.0UJ	3.4	< 2.3	3.0	4.2	11	3.5	3.0
ARSENIC	1.40J	2.57J	1.38J	1.40J	5.55J	3.29J	1.73J	1.48J
BARIUM	32.0J	37.3	26.9	27.7	30.3	180	31.8	33.5
BERYLLIUM	0.335	0.570	0.755	0.637	0.818	0.459	0.376	0.256
CADMIUM	< 0.364	< 0.300	< 0.279	< 0.331	< 0.376	4.10	< 0.290	< 0.339
CALCIUM	2790J	6310J	2160J	2730J	3310J	4450J	2750J	2090J
CHROMIUM, TOTAL	33.1	26.8J	26.0J	33.1J	49.3J	194J	29.2J	27.8J
COBALT	5.71	4.62	4.54	5.21	10.6	7.83	5.11	4.77
COPPER	5.86	6.30	5.23	4.92	14.0	41.5	7.41	4.61
IRON	8600J	9130J	7970J	8780J	20100J	13500J	10100J	7650J
LEAD	5.77J	3.81J	2.30J	5.29J	5.07J	774	3.71J	2.44J
MAGNESIUM	2470J	2450	2390	3260	6370	3900	2550	2230
MANGANESE	97.2J	111J	89.6J	124J	218J	217J	113J	91.6J
MERCURY	0.141	< 0.103	< 0.102	0.146	< 0.120	0.532	0.157	< 0.128
NICKEL	29.2J	24.1	24.3	32.0	46.5	42.9	24.2	23.6
POTASSIUM	805	659	608	765	1890	1080	805	733
SELENIUM	< 0.274UJ	< 0.189UJ	< 0.217UJ	< 0.230UJ	< 0.226UJ	< 0.205UJ	< 0.218UJ	< 0.269UJ
SILVER	< 0.595	< 0.491	< 0.455	< 0.540	< 0.615	2.12	< 0.473	< 0.554
SODIUM	998	285	289	508	2160	317	289	370
THALLIUM	< 0.352	< 0.243	< 0.280	< 0.296	< 0.291	< 0.263	< 0.281	< 0.345
VANADIUM	24	22.9	20.1	22.9	40.3	30.7	25.0	18.6
ZINC	20.8J	19.3	16.7	22.4	42.3	643	20.2	17.1

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 10-4
NAS ALAMEDA - SITE 8
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B08-04-014	B08-05-000	B08-05-002	B08-05-008	Duplicate B08-05-008	B08-05-014	B08-06-000	B08-06-004
Date Sampled	07/29/91	07/30/91	07/30/91	07/30/91	07/30/91	07/30/91	08/07/91	08/07/91
Depth of Sample	14.0 ft	0.0 ft	2.0 ft	8.0 ft	8.0 ft	14.0 ft	0.0 ft	3.5 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	23100J	11800J	3880J	3720J	4030J	4120J	8360J	6160J
ANTIMONY	5.7	5.5	< 2.6	< 2.9	< 2.8UJ	3.0	3.8J	2.7J
ARSENIC	4.61J	3.50J	1.49J	2.08J	1.48	1.52J	3.30J	0.804J
BARIUM	60.0	62.6	20.3	35.6	22.7J	24.1	83.9J	30.8J
BERYLLIUM	1.15	0.998	0.298	0.214	0.393	0.337	0.621	0.373
CADMIUM	< 0.478	0.345	< 0.308	< 0.352	< 0.341	< 0.307	< 0.280	< 0.277
CALCIUM	4690J	13900J	1970J	1010J	1820J	2290J	14300J	2460J
CHROMIUM, TOTAL	81.2J	13.6J	24.8J	24.8J	24.5J	25.1J	8.19J	17.1J
COBALT	12.9	11.8	3.45	5.26	4.42	4.53	9.78J	5.55J
COPPER	38.2	68.8	3.87	5.20	4.01J	4.80	21.7J	45.0J
IRON	29400J	25100J	6670J	7680J	7080J	5880J	20900J	13000J
LEAD	29.0	19.5	2.02J	2.06J	1.96	11.6J	7.97J	3.22J
MAGNESIUM	9870	6540	1810	2300	1860	1850	6340J	4340J
MANGANESE	252J	659J	73.5J	79.9J	73.0J	82.7J	740J	212J
MERCURY	0.453	0.151	< 0.051	< 0.059	< 0.054	< 0.057	0.191	0.115
NICKEL	76.4	19.2	19.7	25.1	20.6J	20.6	10.2	19.6
POTASSIUM	3570	543	582	776	703J	583	376J	653J
SELENIUM	< 0.314UJ	< 0.217UJ	< 0.216UJ	< 0.238UJ	< 0.229UJ	< 0.201UJ	< 0.222UJ	< 0.225UJ
SILVER	< 0.780	0.683	< 0.504	< 0.574	< 0.556	< 0.501	0.722	0.546
SODIUM	6300	677	362	1010	719J	1690	784J	978J
THALLIUM	< 0.404	< 0.279	< 0.278	< 0.306	< 0.294	< 0.259	< 0.285	< 0.289
VANADIUM	67.0	52.5	18.1	16.8	18.0J	19.0	41.8J	24.1J
ZINC	85.6	115	13.7	17.1	14.2J	14.8	90.4J	24.9J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 10-4
NAS ALAMEDA - SITE 8
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B08-06-008	B08-06-014	B08-07-000	B08-07-002	B08-07-005	B08-07-013	Duplicate B08-07-013	B08-08-000
Date Sampled	08/07/91	08/07/91	08/13/91	08/13/91	08/13/91	08/13/91	08/13/91	08/06/91
Depth of Sample	8.0 ft	14.0 ft	0.0 ft	2.0 ft	5.0 ft	12.5 ft	14.0 ft	0.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	5870J	3860J	18100J	4820J	5760J	3950J	2830J	8110J
ANTIMONY	3.5J	2.8J	11J	3.2J	2.9J	< 2.7UJ	< 2.9	3.5J
ARSENIC	2.22J	1.91J	5.71J	1.35J	1.49J	3.65J	1.41J	1.74J
BARIUM	76.9J	27.6J	62.5J	63.0J	49.0J	26.1J	29.6J	74.5J
BERYLLIUM	0.601	0.249	0.789	< 0.135	0.693	< 0.138	< 0.152	0.469
CADMIUM	< 0.396	< 0.312	0.388	< 0.313	< 0.299	< 0.317	< 0.350	< 0.259
CALCIUM	2150J	3560J	6420J	2630J	2450J	2130J	2800J	3760J
CHROMIUM, TOTAL	31.7J	27.4J	16.0	31.8	30.9	25.0	18.7J	35.2
COBALT	6.32J	5.87J	19.7	4.78	5.52	4.35	3.83	7.58
COPPER	20.3J	14.4J	33.1	4.68	5.21	23.8	8.64	17.6
IRON	10500J	7100J	35900J	8070J	8480J	6860J	5160J	12800J
LEAD	4.36J	7.06J	20.6J	1.97J	2.19J	10.4J	42.6J	28.4J
MAGNESIUM	3100J	2090J	7650J	2060J	2290J	1930J	1410J	6360J
MANGANESE	110J	90.2J	1030J	95.1J	105J	118J	207J	379J
MERCURY	< 0.139	0.126	< 0.104	< 0.094	< 0.108	< 0.114	< 0.101	< 0.101
NICKEL	32.7	24.5	12.7J	22.6J	25.1J	21.2J	16.7	48.9J
POTASSIUM	1080J	620J	550	667	925	666	514	690
SELENIUM	< 0.301UJ	< 0.250UJ	< 0.226UJ	< 0.216UJ	< 0.246UJ	< 0.246UJ	< 0.241	< 0.210UJ
SILVER	0.752	0.536	6.17	< 0.511	< 0.489	< 0.518	< 0.571	0.650
SODIUM	1290J	1440J	861	350	519	1580	1170	496
THALLIUM	< 0.388	< 0.322	< 0.290	< 0.278	< 0.316	< 0.316	< 0.310	< 0.270
VANADIUM	23.7J	22.0J	86.8	24.0	24.3	17.5	13.3	21.8
ZINC	24.9J	17.4J	141J	17.1J	18.2J	19.8J	17.3J	148J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 10-4
NAS ALAMEDA - SITE 8
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B08-08-002	B08-08-008	B08-08-014	Duplicate B08-08-014	B08-09-000	B08-09-005	B08-09-008	B08-09-014
Date Sampled	08/06/91	08/06/91	08/06/91	08/06/91	08/07/91	08/07/91	08/07/91	08/07/91
Depth of Sample	2.0 ft	8.0 ft	14.0 ft	14.0 ft	0.0 ft	5.0 ft	8.0 ft	14.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	5430J	3710J	21500J	20300J	9010J	5010J	3000J	4380J
ANTIMONY	3.4J	3.3J	8.3J	5.4J	4.5J	< 2.3UJ	< 2.9UJ	< 2.5UJ
ARSENIC	1.17J	1.47J	7.04J	7.03J	0.893J	0.615J	1.47J	2.32J
BARIUM	25.7J	31.4J	44.3J	43.1J	43.9J	37.0J	30.8J	55.8J
BERYLLIUM	0.701	0.229	1.33	1.18	0.687	0.602	0.234	0.214
CADMIUM	< 0.320	< 0.357	< 0.422	< 0.427	< 0.300	< 0.281	< 0.346	< 0.298
CALCIUM	1990J	1520J	4200J	3790J	2920J	1640J	1480J	1540J
CHROMIUM, TOTAL	28.6	25.5	74.3	70.9	21.6J	24.2J	20.5J	28.4J
COBALT	5.79	4.39	15.1	14.3	7.90J	5.50J	4.25J	6.77J
COPPER	6.95	3.91	28.2	29.7	10.4J	6.71J	4.05J	15.1J
IRON	10400J	6900J	31500J	30200J	18500J	11100J	6240J	10100J
LEAD	1.80J	1.68J	21.4J	8.78J	4.46J	6.93J	2.15J	27.1J
MAGNESIUM	3110J	1820J	11200J	10500J	6530J	3210J	1880J	3350J
MANGANESE	133J	72.4J	354J	345J	322J	171J	72.0J	162J
MERCURY	< 0.103	< 0.122	0.288	< 0.143	< 0.105	< 0.110	0.165	< 0.119
NICKEL	25.1J	20.4J	73.6J	72.0J	17.8	16.5	20.0	37.3
POTASSIUM	652	664	3430	3320	604J	446J	620J	1080J
SELENIUM	< 0.223UJ	< 0.255UJ	< 0.324UJ	< 0.309UJ	< 0.216UJ	< 0.231UJ	< 0.248UJ	< 0.249UJ
SILVER	< 0.522	< 0.583	1.08	0.755	0.609	0.602	0.606	< 0.487
SODIUM	388	829	6810	7060	503J	777J	786J	2820J
THALLIUM	< 0.286	< 0.328	< 0.416	< 0.397	< 0.277	< 0.297	< 0.319	< 0.320
VANADIUM	24.8	17.5	64.8	59.9	31.6J	22.3J	13.5J	22.0J
ZINC	18.3J	14.3J	71.3J	73.8J	23.8J	21.4J	15.7J	35.8J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 10-4
NAS ALAMEDA - SITE 8
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	Duplicate B08-09-014	B08-10-000	B08-10-005	B08-10-008	B08-10-014	B08-11-000	B08-11-004	B08-11-010
Date Sampled	08/07/91	08/07/91	08/07/91	08/07/91	08/07/91	07/30/91	07/30/91	07/30/91
Depth of Sample	14.0 ft	0.0 ft	5.0 ft	8.0 ft	14.0 ft	0.0 ft	4.0 ft	9.5 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	3340J	7170J	6080J	3150J	3270J	6020J	6150J	6970J
ANTIMONY	< 3.1UJ	4.1J	< 2.7UJ	< 2.8UJ	< 2.8UJ	3.6	< 2.5	< 2.9
ARSENIC	3.09J	0.353J	1.38	1.61	1.41	2.11J	1.45J	2.10J
BARIUM	30.1J	25.6J	28.7J	56.3J	16.6J	85.3	40.1	48.0
BERYLLIUM	0.321	0.411	0.418	0.194	0.149	0.327	0.680	0.812
CADMIUM	< 0.369	< 0.282	< 0.328	< 0.337	< 0.337	1.53	< 0.300	< 0.353
CALCIUM	1260J	1810J	2250J	1950J	1620J	3210J	2650J	2410J
CHROMIUM, TOTAL	26.3J	8.95J	21.2J	26.9J	23.8J	72.0J	31.6J	36.6J
COBALT	5.06J	5.91J	6.10J	3.85J	3.97J	5.07	5.54	6.84
COPPER	6.85J	4.33J	5.46J	3.45J	5.45J	24.8	6.00	7.45
IRON	6350J	15500J	12000J	6240J	5840J	9780J	10300J	11400J
LEAD	13.6J	1.09J	4.12	1.77	4.03	159	3.31J	2.78J
MAGNESIUM	2200J	5860J	3640J	1540J	1910J	1960	2810	3250
MANGANESE	91.5J	257J	164J	74.7J	76.9J	218J	120J	112J
MERCURY	0.200	< 0.104	< 0.107	< 0.112	< 0.121	0.370	< 0.049	0.071
NICKEL	25.3	9.69	19.1	16.7	20.9	23.0	28.6	36.6
POTASSIUM	740J	350J	710J	576J	610J	903	782	1080
SELENIUM	< 0.292UJ	< 0.218UJ	< 0.223UJ	< 0.233UJ	< 0.245UJ	< 0.215UJ	< 0.220UJ	< 0.260UJ
SILVER	0.675	0.635	0.706	0.677	0.561	0.898	< 0.489	< 0.576
SODIUM	2150J	464J	645J	375J	1750J	320	336	492
THALLIUM	< 0.376	< 0.280	< 0.287	< 0.299	< 0.315	< 0.277	< 0.282	< 0.335
VANADIUM	16.7J	23.4J	27.3J	15.2J	15.9J	25.1	24.9	26.6
ZINC	18.7J	14.3J	19.2J	12.5J	14.3J	110	20.5	23.7

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 10-4
NAS ALAMEDA - SITE 8
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B08-11-014	B08-12-000	B08-12-005	B08-12-008	B08-12-014
Date Sampled	07/30/91	08/13/91	08/13/91	08/13/91	08/13/91
Depth of Sample	14.0 ft	0.0 ft	5.0 ft	8.0 ft	14.0 ft
PARAMETER REPORTED					
METALS (mg/kg-dry)					
ALUMINUM	3610J	17200J	10500J	4250J	5770J
ANTIMONY	3.0	10.0J	8.3J	3.6J	3.8J
ARSENIC	1.70J	6.03	0.736	1.79	1.72
BARIUM	18.6	87.9J	19.4J	32.4J	29.9J
BERYLLIUM	0.319	0.769	0.688	0.272	0.473
CADMIUM	< 0.321	< 0.271	< 0.312	< 0.334	< 0.317
CALCIUM	1870J	3400J	2750J	1880J	2940J
CHROMIUM, TOTAL	24.0J	15.2	15.7	27.7	36.0
COBALT	4.08	12.3	6.97	5.15	5.68
COPPER	3.45	22.4	4.42	4.83	85.5
IRON	6310J	31600J	21800J	7430J	8410J
LEAD	3.87J	18.5J	1.80J	2.10J	18.7J
MAGNESIUM	1830	7660J	5620J	1970J	2550J
MANGANESE	84.2J	759J	328J	85.4J	117J
MERCURY	< 0.061	< 0.107	< 0.106	< 0.111	< 0.103
NICKEL	22.7	18.4J	12.4J	23.3J	27.6J
POTASSIUM	591	720	1510	751	871
SELENIUM	< 0.241UJ	< 0.224UJ	< 0.218UJ	< 0.244UJ	< 0.251UJ
SILVER	< 0.525	0.799	0.676	< 0.546	0.618
SODIUM	1090	997	1220	343	986
THALLIUM	< 0.309	< 0.288	< 0.280	< 0.314	< 0.322
VANADIUM	16.6	73.0	35.6	18.1	24.6
ZINC	15.7	101J	97.0J	16.1J	22.9J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 10-5
NAS ALAMEDA - SITE 8
GROUNDWATER ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	M08-01	M08-02	M08-03	Duplicate M08-03	M08-04	M08-05
Date Sampled	**09/03/91**	**09/03/91**	**09/03/91**	**09/03/91**	**09/04/91**	**09/03/91**
PARAMETER REPORTED						
VOLATILE ORGANICS (µg/L)						
1,2-DICHLOROETHENE, TOTAL	7.9	< 1.0	< 1.0	NA	< 1.0	< 1.0
BENZENE	15	2.0	1.9	NA	< 1.0	10.0
ETHYLBENZENE	13	2.7	3.0	NA	< 1.0	9.0
XYLENES,TOTAL	3.7	< 1.0	2.1	NA	< 1.0	2.6
SEMIVOLATILE ORGANICS (µg/L)						
ACENAPHTHENE	5.4	1.6	38	NA	< 1.0	24
ANTHRACENE	< 1.0	< 1.0	1.2	NA	< 1.0	< 2.0
FLUORANTHENE	< 1.0	< 1.0	1.9	NA	< 1.0	< 2.0
FLUORENE	< 1.0	< 1.0	2.9	NA	< 1.0	< 2.0
NAPHTHALENE	38	21	9.1	NA	< 1.0	260
PHENANTHRENE	1.6	< 1.0	14	NA	< 1.0	7.3
PYRENE	< 1.0	< 1.0	3.2	NA	< 1.0	< 2.0
PESTICIDES/PCBS (µg/L)						
ALDRIN	<0.050UJ	<0.050UJ	<0.050UJ	NA	<0.050UJ	<0.050UJ
ORGANOPHOSPHORUS PESTICIDES (ug/L)						
BROMACIL	< 2.94	< 2.94	< 2.94	< 2.94	< 2.94	10.2
CARBAMATE/UREA PESTICIDES (ug/L)						
DIURON	< 0.618	< 0.618	< 0.618	< 0.618	< 0.618	1.30
CHLORINATED HERBICIDES (ug/L)	NDUJ	NDUJ	NDUJ	NDUJ	NDUJ	NDUJ

Notes: NA = Not analyzed, < = Analyte reported below detection limit
ND = Not detected
UJ = Qualifed, estimated not detected R = Qualified, not usable
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
TOTAL = Includes "trans" and "cis" isomers for 1,2-DICHLOROETHENE and "o", "p" and "m" positions for XYLENE
Shaded areas highlight detections above the detection limit.

TABLE 10-6
NAS ALAMEDA - SITE 8
GROUNDWATER ANALYTICAL RESULTS FOR METALS

Sample Number Date Sampled	M08-01 09/03/91	M08-02 09/03/91	M08-03 09/03/91	M08-04 09/04/91	M08-05 09/03/91
PARAMETER REPORTED					
METALS (µg/L)					
ALUMINUM	< 31.0	< 31.0	< 31.0	747	31.3
ANTIMONY	< 25.1	< 25.1	< 25.1	< 25.1	< 25.1
ARSENIC	4.5	3.9	4.0	9.3	4.8
BARIUM	83.9	60.9	25.2	209	218
BERYLLIUM	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
CADMIUM	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
CALCIUM	36300J	68900J	38600J	68300J	73000J
CHROMIUM,TOTAL	< 5.7	< 5.7	< 5.7	< 5.7	< 5.7
COBALT	< 6.1	< 6.1	< 6.1	< 6.1	< 6.1
COPPER	3.5	2.2	< 2.1	12.2	22.2
IRON	57.7J	41.9UJ	18.6UJ	3120J	33.7UJ
LEAD	< 2.0	< 2.0	< 2.0	14.1	< 2.0UJ
MAGNESIUM	27500	23300	29700	66700	193000
MANGANESE	155	96.8	304	809	1310
MERCURY	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
NICKEL	< 13.2	< 13.2	< 13.2	< 13.2	< 13.2
POTASSIUM	24400	19900	27800	39300	79800
SELENIUM	< 2.1UJ	< 2.1UJ	< 2.1UJ	< 2.1UJ	< 2.1UJ
SILVER	< 4.9	< 4.9	< 4.9	< 4.9	< 4.9
SODIUM	574000J	235000J	243000J	569000J	2280000J
THALLIUM	< 2.7	< 2.7	< 2.7	< 2.7	< 2.7
VANADIUM	< 4.2	< 4.2	4.9	13.3	15.4
ZINC	3.8UJ	4.7UJ	6.6UJ	35.7J	< 2.3

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 10-7
NAS ALAMEDA - SITE 8
GROUNDWATER ANALYTICAL RESULTS FOR GENERAL CHEMICALS

Sample Number Date Sampled	M08-01 09/03/91	M08-02 09/03/91	M08-03 09/03/91	M08-03DUP 09/03/91	M08-04 09/04/91	M08-05 09/03/91
PARAMETER REPORTED						
PHYSICAL PARAMETERS-FIELD						
pH, FIELD (Std. Units)	8.00	7.00	7.00	7.00	7.42	8.00
SP. COND., FIELD @25C (µmhos/cm)	3100	1400	1400	1400	3000	14000
WATER TEMP (C)	22.0	21.0	21.0	21.0	19.2	20.0
TOTAL ORGANIC CARBON (mg/L)						
CARBON, TOC	47.6J	9.0J	11.5J	NA	15.3J	15.4J

Notes: NA = Not analyzed
J = Qualified, estimated value
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

11.0 SITE 10A
BUILDING 400
MISSILE REWORK OPERATIONS

11.1 SITE DESCRIPTION AND BACKGROUND

Site 10A consists of Building 400, and is located south of Avenue F, between Buildings 11 and 12 (Figure 11-1). It is approximately 600 feet north of the Sea Plane Lagoon. The building has been in operation since the mid 1950s and was used for missile rework operations until 1972. Wastes generated prior to 1972 included paint sludges, metal shavings, paint strippers, cleaning solvents such trichlorethene (TCE) and carbon tetrachloride, testing fluids and miscellaneous waste oils, and oil and grease. Solid waste generated at this facility was disposed of in the West Beach Landfill (Canonie, 1990a). Wastewater streams were discharged to the industrial waste sewer system. Prior to 1972, the wastewater was discharged without pretreatment to the Sea Plane Lagoon (Canonie, 1990a). Site 10A has not been investigated in the past; therefore, no analytical data are available.

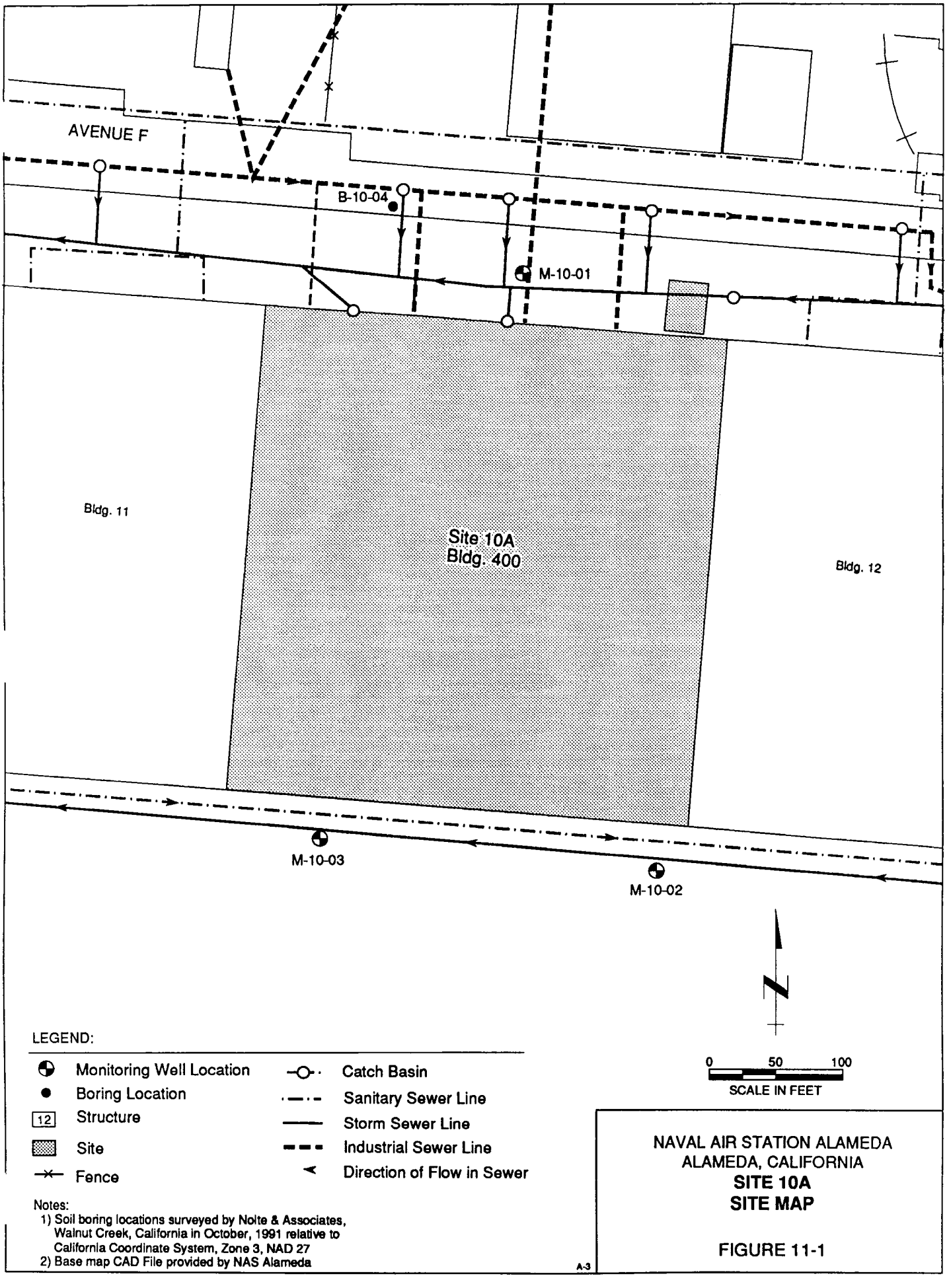
Figure 11-1 shows the site layout and the configuration of the storm, sanitary, and industrial sewer lines around Site 10A. Four industrial sewer lines leave the northern side of Building 400 and join the main line running under Avenue F. The sanitary sewer line runs from the southern side of the building and immediately joins the main running east. Storm sewer lines connect the building downspouts to mains under Avenue F and the aircraft parking apron south of the building.

11.2 CURRENT USE

Currently, the building is used for paint stripping, constructing fiberglass aircraft components, and aircraft parts cleaning operations. Aircraft are reworked in the building. Waste generated at this site includes paint sludges, paint strippers, cleaning solvents such as TCE and carbon tetrachloride, and miscellaneous waste oils, and oil and grease.

11.3 REMEDIAL INVESTIGATION

The field investigation at Site 10A included drilling of soil borings, soil sampling, installation and sampling of monitoring wells, in-situ permeability testing, and water level measuring. Field methods are described in Appendix A. Borings were drilled on the north side of the site in the vicinity of industrial sewer lines, and on the south side of the site in the vicinity of the sanitary and storm sewer lines. All



Notes:
1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda

A-3

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 10A
SITE MAP

FIGURE 11-1

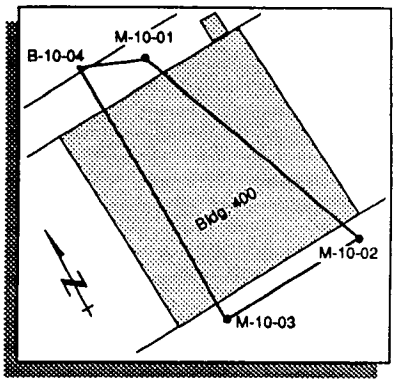
borings were drilled with a hollow stem auger rig (Figure 11-1). Monitoring wells were installed in three of the four borings. Boring logs and well construction details are included in Appendix C. The wells were constructed with 10 feet of screen. The well on the north side of the building was screened from 4 to 14 feet below ground surface; the other two wells on the south side of the building were screened from 3 feet to 13 feet below ground surface.

11.3.1 Site Geology/Hydrogeology

Sediments underlying Site 10A can be divided into two groups: fill material and native sediments. The ground surface is covered by concrete, approximately 1 foot thick. Fill material underlies the site from below the concrete to approximately 12 feet below ground surface. The fill material consists of fine to medium-grained, well-sorted sands (SP) that were dredged from the Sea Plane Lagoon and/or Oakland Inner Channel or Harbor (Canonie 1990a). In three of the borings, native material consisting of interbeds of clay (CL), well sorted fine-grained sands (SP), and moderately well-sorted silty sands (SM) was encountered below approximately 12 feet. The native material is interpreted to be Holocene Bay Mud. A fence diagram illustrating the lateral and vertical relationships of the fill and native sediments is shown on Figure 11-2. Geotechnical analytical data are listed in Table 11-1, and the laboratory data sheets are included in Appendix E.

In-situ permeability (slug) tests were conducted in the wells at Site 10A. The hydraulic conductivities, as determined by the Bouwer and Rice rising-head method, ranged from 1.1E-03 cm/sec to 5.6E-04 cm/sec (Bouwer and Rice, 1976; Bouwer, 1989). In-situ permeability test data are in Appendix E.

The average depth to groundwater was 4.3 feet below ground surface and ranged from 3.6 to 4.9 feet below ground surface. Groundwater elevations were collected from August to December, 1991, and are listed in Table 11-2. Water level data were collected during different phases of the moon and at different times within the diurnal tidal cycle to determine whether fluctuations were affecting groundwater elevations. As shown in Table 11-2, groundwater elevations vary depending on the timing of the measurement. The groundwater appears to be affected by either tidal fluctuations or seasonal fluctuations. Groundwater flow was measured to the east-northeast at a gradient of approximately 0.0017 ft/ft on August 29, 1991 and to the east-southeast at a gradient of 0.0021 on December 5, 1991 (Figures 11-3 and 11-4). A tidal influence study was performed in January, 1992. The results will be included in the draft final version of this report.



LEGEND:

- SW Gravelly Sand
- SP Sand
- SC Clayey Sand
- CL Clay
- CN Concrete
- Approximate Fill/Native Sediment Interface
- First Water During Drilling
- Water Level During Water Sampling
- Monitoring Well
- Screened Interval

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 10A
FENCE DIAGRAM

FIGURE 11-2

TABLE 11-1

SITE 10A
BUILDING 400
GEOTECHNICAL SAMPLE LABORATORY TEST RESULTS

Sample No.	Depth (ft)	Soil Classification Laboratory	Soil Classification Field	Moisture Content (%)	Dry Density (pcf)	Specific Gravity	CEC (meq/100g)	TOC (%w/w)	Permeability Effective Stresses (psi)	Permeability Hydraulic Conductivity (cm/s)
B-10-01	7-7.5	NA	SP	17	110.5	NA	3.8	NA	4	6.81E-04
B-10-01	13-13.5	NA	CL	43	81	NA	NA	< 0.1	7	2.82E-07
B-10-02	7-7.5	SP	SP	20	103.5	2.72	14.7	< 0.1	NA	NA
B-10-03	4-4.5	NA	SP	NA	NA	NA	NA	< 0.1	NA	NA
B-10-03	13-13.5	NA	SP	NA	NA	NA	18.8	NA	NA	NA

NA - Not Analyzed
Parameters not detectect are reported as less than method detection limit.

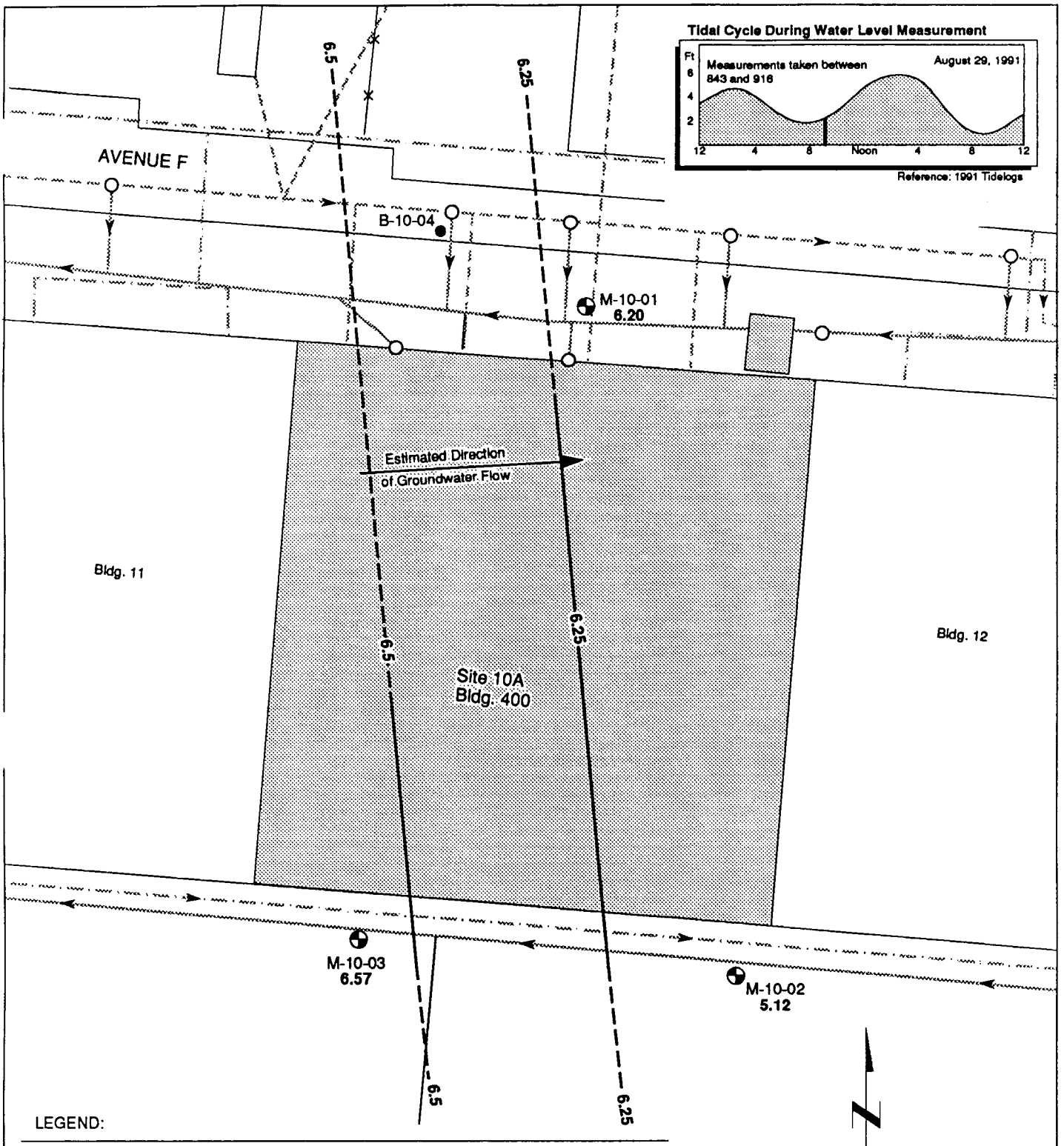
Laboratory Methods (Units):
Soil Classification - Unified Soil Classification System (USCS) - ASTM D2488
Moisture Content - ASTM D2216 (percent)
Dry Density - ASTM D2937 (pounds per cubic foot)
Specific Gravity - ASTM D854
Cation Exchange Capacity (CEC) - EPA 9080 (milliequivalents per 100 grams)
Total Organic Carbon (TOC) - Walkey and Black (percent of wet weight)
Effective Stress - EPA 9100 (pounds per square inch)
Hydraulic Conductivity - EPA 9100 (centimeters per second)

TABLE 11-2

SITE 10A
BUILDING 400
WATER LEVEL DATA

		Date	Time	Water Level in feet	Water Elevation in feet
M10-01					
ToC	*10.62*	8/29/91	843	4.42	6.20
		9/23/91	1004	4.45	6.17
		11/12/91	1157	4.29	6.33
		11/12/91	1252	4.27	6.35
		11/12/91	1425	4.27	6.35
		11/12/91	1618	4.28	6.34
		11/22/91	920	4.16	6.46
		11/22/91	1106	4.17	6.45
		11/22/91	1220	4.15	6.47
		12/5/91	1025	4.05	6.57
		12/5/91	1125	4.05	6.57
M10-02					
ToC	*11.00*	8/29/91	916	4.88	6.12
		9/23/91	932	5.05	5.95
		11/12/91	1149	4.87	6.13
		11/12/91	1259	4.87	6.13
		11/12/91	1432	4.87	6.13
		11/12/91	1627	4.88	6.12
		11/22/91	929	4.86	6.14
		11/22/91	1112	4.87	6.13
		11/22/91	1234	4.87	6.13
		12/5/91	1031	4.98	6.02
		12/5/91	1122	4.97	6.03
M10-03					
ToC	*10.16*	8/29/91	903	3.59	6.57
		9/23/91	832	3.45	6.71
		11/12/91	1152	3.53	6.63
		11/12/91	1257	3.52	6.64
		11/12/91	1429	3.52	6.64
		11/12/91	1624	3.52	6.64
		11/22/91	926	3.53	6.63
		11/22/91	1109	3.53	6.63
		11/22/91	1227	3.52	6.64
		12/5/91	1033	3.59	6.57
		12/5/91	1127	3.58	6.58

ToC - Top of Casing
Elevation datum - USGS Mean Low Low Water



LEGEND:

- Monitoring Well Location
- 5.12 Groundwater elevation (feet above mean low low water)
- Groundwater Contour
- Boring Location
- Structure
- Site
- Catch Basin
- Sanitary Sewer Line
- Storm Sewer Line
- Industrial Sewer Line
- Direction of Flow in Sewer
- Fence

Notes:
1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda

A-3

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 10A
GROUNDWATER CONTOUR
AUGUST 29, 1991

FIGURE 11-3

11.3.2 Analytical Results - Soil Samples

A total of 17 soil samples (16 samples and one duplicate) were collected from the borings at Site 10A. The duplicate sample is of soil sample B10-04-010. Surface samples were analyzed for SVOCs, pesticides/PCBs, and metals. Subsurface samples were analyzed for these constituents plus VOCs. Analytical results are summarized in Tables 11-3 and 11-4 and can be found at the end of the text in this section. Laboratory QA/QC data are summarized in the QCSR submitted under separate cover.

Selected samples were also analyzed for TOC content and soil pH (Section 3.0). Although TOC and soil pH data will be used in the feasibility study, they will not be discussed in this report. Analytical results for these parameters are summarized in Appendix B.

11.3.2.1 Volatile Organic Compounds. Acetone was the only VOC detected in soil samples from Site 10A. Acetone was detected in 11 samples collected from depths between 5 to 14 feet below ground surface. The concentrations ranged from 12 to 110 µg/kg and there was no apparent pattern of distribution. Acetone was detected in three method blanks run during the analysis of samples from Site 10A, and thus the results were qualified (Section 3.0). After data qualification, six samples were considered not detected and the remaining five were considered valid detections. Qualified data are flagged in Table 11-3.

11.3.2.2 Semivolatile Organic Compounds. Analytical results for SVOCs are included in Table 11-3. SVOCs were detected in soil samples from all of the borings at Site 10A.

Bis (2-ethylhexyl) phthalate is present in 17 soil sample analyzed at concentrations ranging from 109 to 3,000 µg/kg. Bis (2-ethylhexyl) phthalate was detected in 16 method blanks run during the analysis of samples from Site 10A and, thus, the results were qualified (Section 3.0). After data qualification, 16 of the samples are considered not detected and the remaining sample result is considered an estimate. Qualified data are flagged in Table 11-3. Data qualifiers are discussed in Section 3.

The SVOCs that were detected in the deepest soil sample collected from each of the borings are classified as PAH. PAH were detected in 4 soil samples; concentrations ranged from 130 to 540 µg/kg.

11.3.2.3 Metals. Analytical results for metals are listed in Table 11-4. Beryllium was detected in 14 samples, concentrations ranged from 0.171 to 1.05 mg/kg. Chromium was detected in 17 soil samples; concentrations ranged from 13.8 to 35.6 mg/kg. Copper was detected in 17 soil samples; concentrations ranged from 3.4 to 9.48 mg/kg. Lead was detected in 17 soil samples; concentrations ranged

from 1.62 to 20.8 mg/kg. Mercury was detected in two soil samples; concentrations ranged from 0.106 to 0.119 mg/kg. Nickel was detected in 17 soil samples; concentrations ranged from 10.2 to 36.7 mg/kg. As discussed earlier in Section 3.0 of this report, no base-specific background data for metals in soils are available for the NAS Alameda area. Background data will be generated in a future phase of work and an analysis of metals data will be included in the Phase 7 comprehensive RI report. Without background data, it is not possible to evaluate whether a given metal concentration is naturally occurring or if it represents contamination.

11.3.3 Analytical Results - Groundwater Samples

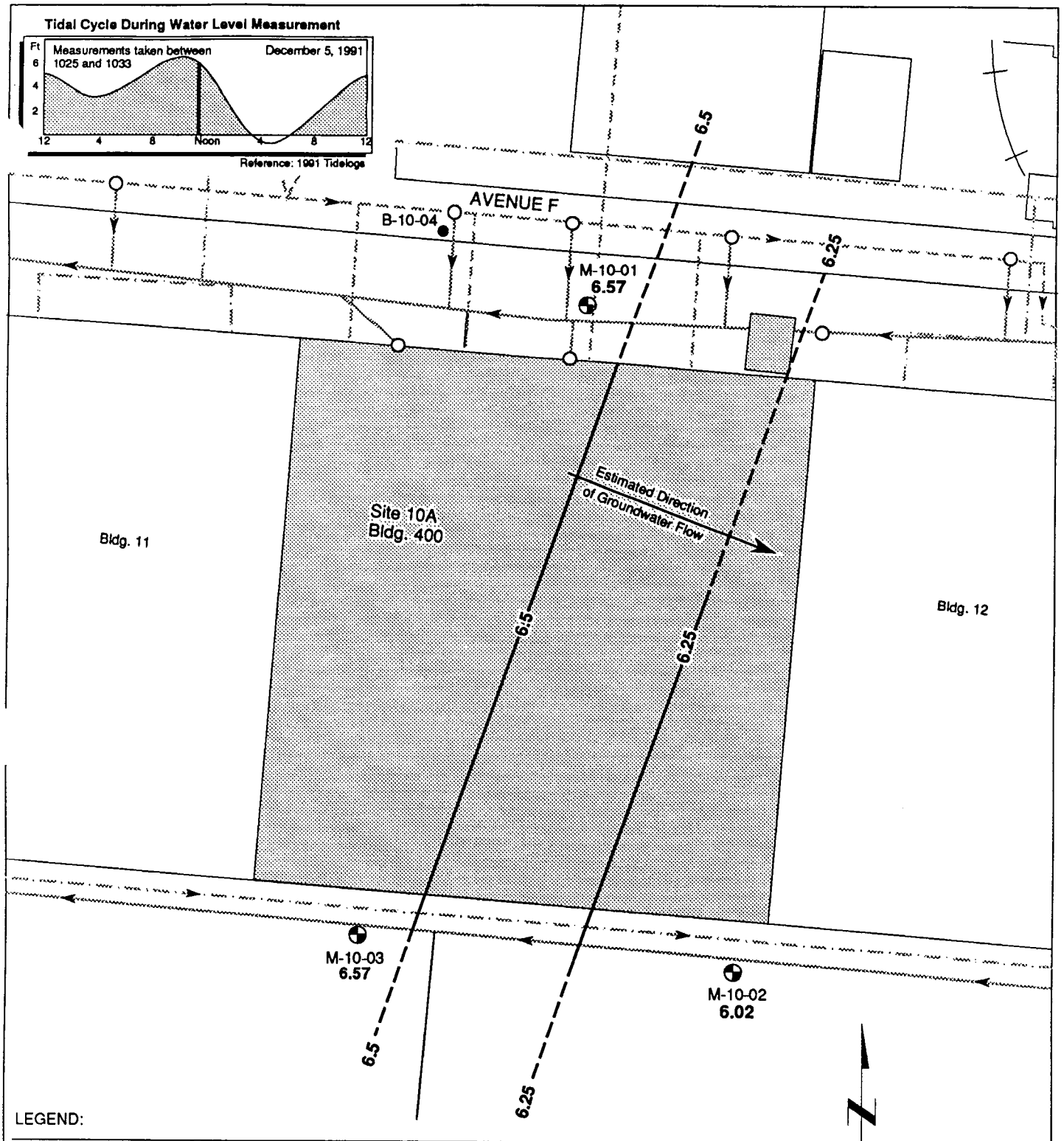
Groundwater samples were collected on August 29, 1991, from the three wells installed at Site 10A. Groundwater samples were analyzed for VOCs, SVOCs, and metals. Analytical results are summarized in Tables 11-5 and 11-6 and can be found at the end of the text in this section. Laboratory QA/QC data are summarized in the QCSR submitted under separate cover.

11.3.3.1 Volatile Organic Compounds. Volatile organic compounds were detected in all three wells. DCA, DCE, 1,2-dichloropropane, and TCE were all detected at concentrations ranging from 1.5 to 3.4 µg/L only in groundwater sample M10-01. Chloroform was detected in the groundwater samples from wells M10-02 and M10-03 at concentrations of 2.5 and 52 µg/L, respectively.

11.3.3.2 Semivolatile Organic Compounds. Analytical results for SVOCs are summarized in Table 11-5. SVOCs were only detected in the groundwater sample from well M10-01. One PAH, pyrene, was detected at a concentration of 1.0 µg/L. Two ethers were detected, bis (2-chloroisopropyl) ether at a concentration of 31 µg/L, and bis (2-chloroethyl) ether at a concentration of 86 µg/L.

11.3.3.3 Metals. Analytical results for metals are listed in Table 11-6. Presently there are no base-specific background metals data for comparison purposes. Background data will be collected at a later date and an evaluation of metals data will be included in the Phase 7 comprehensive RI report.

11.3.3.4 General Chemicals. Analytical results for general chemicals, pH, and TOC are summarized in Table 11-7. Groundwater pH values are 8.00 to 9.57. Groundwater conductivity was measured during sampling of the wells and ranged from 90 to 145 micro-ohms per centimeter. This indicates that the groundwater at Site 10A is fresh in character (Driscoll, 1987). TOC values in the wells at Site 10A are comparable to those identified in wells installed at other sites during this investigation.



LEGEND:

- Monitoring Well Location
- 6.02 Groundwater elevation (feet above mean low low water)
- Groundwater Contour
- Boring Location
- Structure
- Site
- Catch Basin
- Sanitary Sewer Line
- Storm Sewer Line
- Industrial Sewer Line
- Direction of Flow in Sewer
- Fence

Notes:
1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda

A-3

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 10A
GROUNDWATER CONTOUR
DECEMBER 5, 1991

FIGURE 11-4

TABLE 11-3
NAS ALAMEDA - SITE 10A
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B10-01-000	B10-01-005	B10-01-008	B10-01-014	B10-02-000	B10-02-005	B10-02-008
Date Sampled	08/05/91	08/05/91	08/05/91	08/05/91	08/02/91	08/02/91	08/02/91
Depth of Sample	0.0 ft	5.0 ft	8.0 ft	14.0 ft	0.0 ft	5.0 ft	8.0 ft
PARAMETER REPORTED							
VOLATILE ORGANICS (µg/kg-dry)							
ACETONE	NA	14	42UJ	41UJ	NA	58UJ	54UJ
SEMIVOLATILE ORGANICS (µg/kg-dry)							
BENZO(A)PYRENE	< 150	< 170	< 170	230	< 150	< 170	< 210
BENZO(GHI)PERYLENE	< 180	< 190	< 190	200	< 170	< 200	< 240
BENZO(K)FLUORANTHENE	< 110	< 120	< 120	150	< 110	< 120	< 150
BIS(2-ETHYLHEXYL)PHTHALATE	270UJ	350UJ	3000J	520UJ	230UJ	890UJ	440UJ
CHRYSENE	< 110	< 120	< 120	130	< 110	< 120	< 150
FLUORANTHENE	< 88	< 97	< 96	180	< 85	< 98	< 120
PYRENE	< 88	< 97	< 96	360	< 85	< 98	< 120

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected, J = Qualified, estimated value
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 11-3
NAS ALAMEDA - SITE 10A
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B10-02-014	B10-03-000	B10-03-002	B10-03-010	B10-03-014	B10-04-000	B10-04-005
Date Sampled	08/02/91	08/01/91	08/01/91	08/01/91	08/01/91	08/02/91	08/02/91
Depth of Sample	14.0 ft	0.0 ft	2.0 ft	9.5 ft	14.0 ft	0.0 ft	5.0 ft
PARAMETER REPORTED							
VOLATILE ORGANICS (µg/kg-dry)							
ACETONE	15	NA	< 11	13	13	NA	40UJ
SEMIVOLATILE ORGANICS (µg/kg-dry)							
BENZO(A)PYRENE	< 170	< 150	< 150	< 170	< 170	< 140	< 170
BENZO(GHI)PERYLENE	< 200	< 170	< 170	< 200	< 200	< 170	< 190
BENZO(K)FLUORANTHENE	< 120	< 110	< 110	< 120	< 120	< 100	< 120
BIS(2-ETHYLHEXYL)PHTHALATE	350UJ	450UJ	500UJ	850UJ	230UJ	1500UJ	200UJ
CHRYSENE	< 120	< 110	< 110	< 120	< 120	< 100	< 120
FLUORANTHENE	< 100	< 85	< 85	< 98	230J	< 83	< 96
PYRENE	260J	< 85	< 85	< 98	440J	< 83	< 96

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected, J = Qualified, estimated value
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 11-3
NAS ALAMEDA - SITE 10A
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

		Duplicate	
Sample Number	**B10-04-010**	**B10-04-010**	**B10-04-014**
Date Sampled	**08/02/91**	**08/02/91**	**08/02/91**
Depth of Sample	**9.5 ft**	**8.0 ft**	**14.0 ft**
PARAMETER REPORTED			
VOLATILE ORGANICS (µg/kg-dry)			
ACETONE	23	< 13	28UJ
SEMIVOLATILE ORGANICS (µg/kg-dry)			
BENZO(A)PYRENE	< 170	< 180	220J
BENZO(GHI)PERYLENE	< 200	< 200	< 230
BENZO(K)FLUORANTHENE	< 120	< 130	< 140
BIS(2-ETHYLHEXYL)PHTHALATE	1200UJ	240UJ	190UJ
CHRYSENE	< 120	< 130	< 140
FLUORANTHENE	< 98	< 100	< 110
PYRENE	< 98	< 100	540J

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected, J = Qualified, estimated value
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 11-4
NAS ALAMEDA - SITE 10A
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B10-01-000	B10-01-005	B10-01-008	B10-01-014	B10-02-000	B10-02-005	B10-02-008	B10-02-014
Date Sampled	08/05/91	08/05/91	08/05/91	08/05/91	08/02/91	08/02/91	08/02/91	08/02/91
Depth of Sample	0.0 ft	5.0 ft	8.0 ft	14.0 ft	0.0 ft	5.0 ft	8.0 ft	14.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	6120J	4970J	5990J	3780J	5320J	4410J	5300J	3000J
ANTIMONY	< 2.7UJ	< 3.0UJ	< 3.0UJ	< 3.1UJ	< 2.6UJ	< 3.1UJ	< 3.5UJ	< 3.0UJ
ARSENIC	2.96	1.76	1.80	2.90	1.49	1.56	1.94	2.39
BARIUM	45.8J	27.3J	38.9J	12.1J	46.4J	25.3J	26.8J	12.1J
BERYLLIUM	0.962	0.427	1.05	0.601	0.331	0.171	< 0.182	0.426
CADMIUM	0.415	< 0.353	< 0.358	< 0.370	< 0.314	< 0.368	< 0.420	< 0.362
CALCIUM	4790J	3100J	3030J	6100J	2940J	2190J	2880J	4430J
CHROMIUM, TOTAL	28.6J	29.3J	35.3J	14.9J	30.1J	27.3J	35.6J	13.8J
COBALT	6.83	4.80	5.91	3.78	5.91	4.80	5.60	3.39
COPPER	9.48	4.64	5.57	4.39	4.86	4.79	4.75	3.74
IRON	10300J	7990J	9330J	4910J	9070J	7510J	8830J	4180J
LEAD	20.8	1.76	1.90	3.52	2.08	1.83	1.93	2.68
MAGNESIUM	2950	2370	2950	1510	2630	2500	2590	1260
MANGANESE	139	91.8	106	50.0	122	89.2	103	47.4
MERCURY	< 0.100	< 0.112	< 0.112	< 0.115	< 0.096	< 0.112	< 0.141	< 0.123
NICKEL	24.9	24.5	30.3	12.6	24.8	25.8	29.0	10.2
POTASSIUM	822	808	892	683	754	749	835	575
SELENIUM	< 0.231UJ	< 0.251UJ	< 0.251UJ	< 0.245UJ	< 0.223UJ	< 0.251UJ	< 0.307UJ	< 0.260UJ
SILVER	0.622	< 0.577	< 0.584	< 0.605	< 0.512	< 0.601	< 0.686	< 0.592
SODIUM	378J	321J	506J	739J	215J	127J	342J	439J
THALLIUM	< 0.297	< 0.323	< 0.322	< 0.314	< 0.287	< 0.323	< 0.395	< 0.334
VANADIUM	27.9	21.7	24.9	13.4	23.2	18.5	23.9	11.2
ZINC	29.9J	18.6J	21.8J	15.5J	17.5J	18.0J	19.8J	11.4J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 11-4
NAS ALAMEDA - SITE 10A
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B10-03-000	B10-03-002	B10-03-010	B10-03-014	B10-04-000	B10-04-005	B10-04-010	Duplicate B10-04-010	B10-04-014
Date Sampled	08/01/91	08/01/91	08/01/91	08/01/91	08/02/91	08/02/91	08/02/91	08/02/91	08/02/91
Depth of Sample	0.0 ft	2.0 ft	9.5 ft	14.0 ft	0.0 ft	5.0 ft	9.5 ft	8.0 ft	14.0 ft
PARAMETER REPORTED									
METALS (mg/kg-dry)									
ALUMINUM	4260J	6160J	5190J	3790J	3600J	4330J	5840J	6050J	6230J
ANTIMONY	< 2.6UJ	< 2.6UJ	< 3.1UJ	< 2.9UJ	2.3	< 2.9UJ	< 3.1UJ	< 3.1UJ	< 3.4UJ
ARSENIC	1.91	1.77	1.81	2.98	1.11J	1.71	2.03	2.46	3.59
BARIUM	29.6J	41.1J	38.0J	25.1J	21.5	28.6J	54.9J	79.9J	37.1J
BERYLLIUM	0.369	0.699	< 0.158	0.528	0.690	< 0.150	0.851	0.799	0.220
CADMIUM	< 0.307	< 0.309	< 0.365	< 0.341	< 0.246	< 0.347	< 0.365	< 0.366	< 0.408
CALCIUM	2940J	2900J	2510J	5440J	1790J	2310J	2080J	2420J	4820J
CHROMIUM, TOTAL	26.1J	35.1J	27.6J	19.7J	23.5J	30.0J	30.6J	32.8J	24.1J
COBALT	5.65	5.24	4.86	3.88	3.72	4.31	5.80	6.12	5.19
COPPER	5.21	5.34	3.58	3.40	4.58	4.03	7.86	6.47	7.72
IRON	6970J	10200J	7780J	5280J	6920J	7160J	9830J	10100J	8940J
LEAD	2.95	2.90	1.68	2.38	2.01J	1.62	2.91	3.16	4.30
MAGNESIUM	2010	2830	2370	1650	2250	2140	3310	3470	3100
MANGANESE	83.9	124	89.6	63.7	87.3J	81.9	119	123	93.6
MERCURY	0.106	< 0.090	< 0.116	0.119	< 0.049	< 0.105	< 0.109	< 0.118	< 0.130
NICKEL	20.6	28.3	24.8	15.3	21.5	22.6	35.9	36.7	22.0
POTASSIUM	622	783	850	707	606	678	1020	1060	1200
SELENIUM	< 0.215UJ	< 0.222UJ	< 0.255UJ	< 0.248UJ	< 0.182UJ	< 0.243UJ	< 0.254UJ	< 0.257UJ	< 0.290UJ
SILVER	< 0.502	< 0.505	< 0.596	< 0.557	< 0.402	0.592	< 0.597	< 0.598	< 0.666
SODIUM	113J	155J	400J	490J	898	269J	1150J	1060J	2090J
THALLIUM	< 0.277	< 0.285	< 0.328	< 0.319	< 0.233	< 0.312	< 0.326	< 0.331	< 0.372
VANADIUM	18.9	30.3	21.1	14.6	17.0	20.5	22.6	23.6	21.1
ZINC	16.6J	18.0J	18.2J	15.7J	15.1	16.7J	24.7J	25.6J	27.3J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 11-5
NAS ALAMEDA - SITE 10A
GROUNDWATER ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	M10-01	M10-02	M10-03
Date Sampled	08/29/91	08/29/91	08/29/91
PARAMETER REPORTED			
VOLATILE ORGANICS (µg/L)			
1,1-DICHLOROETHANE	1.5	< 1.0	< 2.0
1,2-DICHLOROETHENE, TOTAL	3.4	< 1.0	< 2.0
1,2-DICHLOROPROPANE	1.4	< 1.0	< 2.0
CHLOROFORM	< 1.0	2.5	52
TRICHLOROETHENE	2.1	< 1.0	< 2.0
SEMIVOLATILE ORGANICS (µg/L)			
BIS(2-CHL'ISOPROPYL) ETHER	31	< 1.0	< 1.0
BIS(2-CHLOROETHYL) ETHER	86	< 1.5	< 1.5
PYRENE	1.0	< 1.0	< 1.0

Notes: < = Analyte reported below detection limit
TOTAL = Includes "trans" and "cis" isomers
Shaded areas highlight detections above the detection limit.
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 11-6
NAS ALAMEDA - SITE 10A
GROUNDWATER ANALYTICAL RESULTS FOR METALS

Sample Number	M10-01	M10-02	M10-03
Date Sampled	08/29/91	08/29/91	08/29/91
PARAMETER REPORTED			
METALS (µg/L)			
ALUMINUM	75.3	1210	133
ANTIMONY	< 25.1	< 25.1	< 25.1
ARSENIC	8.8	5.3	12.6
BARIUM	10.9	259	2.1
BERYLLIUM	< 1.3	< 1.3	< 1.3
CADMIUM	< 3.0	< 3.0	< 3.0
CALCIUM	5380J	15500J	352J
CHROMIUM,TOTAL	< 5.7	< 5.7	< 5.7
COBALT	< 6.1	< 6.1	< 6.1
COPPER	2.7	< 2.1	19.2
IRON	124J	3950J	124J
LEAD	< 2.0UJ	< 2.0UJ	< 2.0UJ
MAGNESIUM	5280	5400	157
MANGANESE	53.4	238	4.3
MERCURY	< 0.2	< 0.2	< 0.2
NICKEL	57.3	< 13.2	< 13.2
POTASSIUM	9610	7880	3750
SELENIUM	< 2.1UJ	< 2.1UJ	< 2.1UJ
SILVER	< 4.9	< 4.9	< 4.9
SODIUM	237000J	42000J	23000J
THALLIUM	< 2.7UJ	< 2.7UJ	< 2.7UJ
VANADIUM	4.6	51.0	37.9
ZINC	5.6UJ	38.8J	10.6UJ

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 11-7
NAS ALAMEDA - SITE 10A
GROUNDWATER ANALYTICAL RESULTS FOR GENERAL CHEMICALS

Sample Number Date Sampled	M10-01 08/29/91	M10-02 08/29/91	M10-03 08/29/91
PARAMETER REPORTED			
PHYSICAL PARAMETERS-LAB			
ALKALINITY, BICA (mg/L-CaC03)	49.0	< 5.0	< 5.0
ALKALINITY, CARB (mg/L-CaC03)	< 5.0	14.0	< 5.0
ALKALINITY, NC/OH (mg/L-CaCO3)	< 5.0	< 5.0	< 5.0
ALKALINITY, PHENOLPH (mg/L)	< 5.0	8.0	< 5.0
ALKALINITY, T. (mg/L-CaCO3)	53.0J	15.0J	< 5.0
PHYSICAL PARAMETERS-FIELD			
pH, FIELD (Std. Units)	8.00	9.57	9.00
SP. COND., FIELD @25C (µmhos/cm)	100.0	145	90.0
WATER TEMP (C)	21.0	21.0	22.0
TOTAL ORGANIC CARBON (mg/L)			
CARBON, TOC	9.0	12.0	16.8
ANIONS (mg/L)			
CHLORIDE	227.8J	6.487J	4.022J
FLUORIDE	0.44J	0.39J	0.61J
NITROG, NO2 + NO3	0.023	0.063	0.058
SULFATE	27.69J	17.71J	6.545J

Notes: J = Qualified, estimated value
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

12.0 SITE 12
BUILDING 10
POWER PLANT

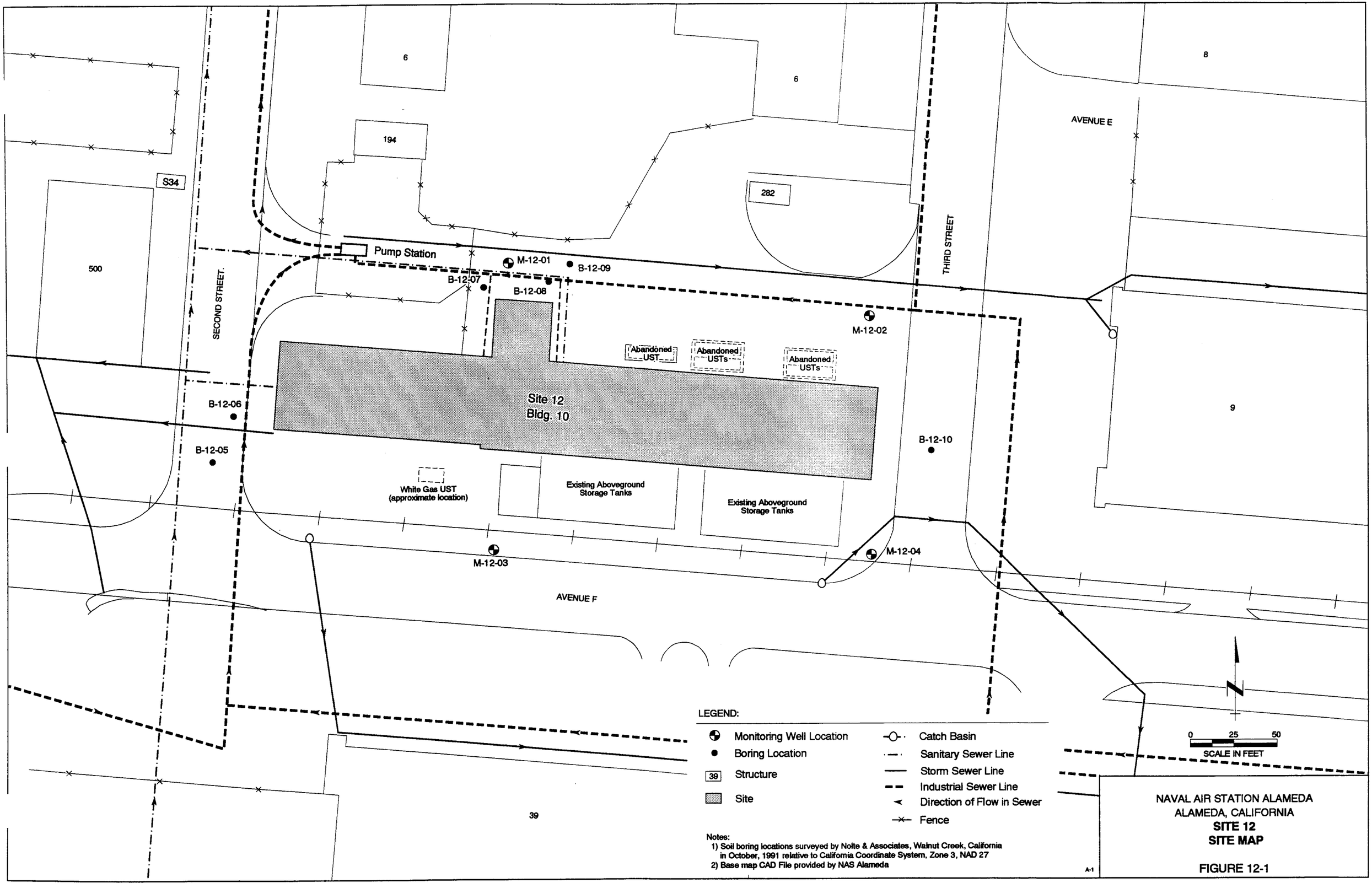
12.1 SITE DESCRIPTION AND BACKGROUND

Site 12 consists of Building 10, the NAS Alameda power plant. It is located north of Avenue F between Second and Third Streets (Figure 12-1). Until the early 1970s, the boilers burned bunker "C" fuel oil. The fuel oil was stored in five USTs located along the northeast side of the building. Four of the tanks each had a volume of 17,000 gallons and the volume of the fifth tank was 24,000 gallons. After the Navy converted the boilers to natural gas, the five tanks were abandoned in place by filling the cavities with sand. A sixth tank is located near the southwest corner of the building (Figure 12-1). Product in the sixth tank was analyzed by a laboratory and identified as white gas. The Navy removed the contents from the tank and it is currently empty. The volume of this tank is unknown. Releases of boiler blowdown water containing caustic soda, phosphate, and sulfide were discharged into the industrial waste sewer during past operations at the power plant (Canonie, 1990a).

Two industrial waste sewer lines exit near the middle of the north side of the power plant and connect with a main line located in the alley. This main line, which originates in Building 114, to the north of Building 10, flows westward to the Industrial Waste Pump Station No. 1 located between the power plant and Building 194 (Figure 12-1). The line continues west and then north under Second Street. Two sanitary sewer lines exit Building 10. One is located on the north side of Building 10 near the most easterly industrial waste sewer line and the other on the west side of Building 10. Both lines connect to a sanitary sewer main underneath Second Street. Storm sewer lines are located near the southwest and southeast corners of Building 10 and in the alley north of Building 10 and the industrial waste sewer lines. Figure 12-1 shows the configuration of the site and the layout of the sanitary, industrial, and storm sewer lines.

12.2 CURRENT USE

The power plant currently houses seven operating boilers fueled by natural gas to generate power for NAS Alameda. Diesel fuel is used as a backup for the boilers and is stored in nine aboveground tanks located in a bermed yard south of the building. The combined total capacity of these tanks is 158,000 gallons. There is no documented evidence of leaks from these tanks (Canonie, 1990a).



Notes:
1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda

A-1

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 12
SITE MAP

FIGURE 12-1

12.3 REMEDIAL INVESTIGATION

In this investigation, 10 soil borings were drilled around the perimeter of Building 10 (Canonie 1990a) and near sewer junctions in the locations shown on Figure 12-1. Groundwater monitoring wells were constructed in four of the 10 borings. Field methods are described in Appendix A. Boring logs and well construction diagrams are included in Appendix C. Geophysicists inspected each location for underground utilities and other hidden obstructions before drilling activities commenced.

Water levels in the monitoring wells were periodically measured to determine groundwater flow directions and possible tidal influences. Rising head in-situ permeability tests were performed to estimate the permeability of the screened zones in these monitoring wells. In-situ permeability test data are included in Appendix E.

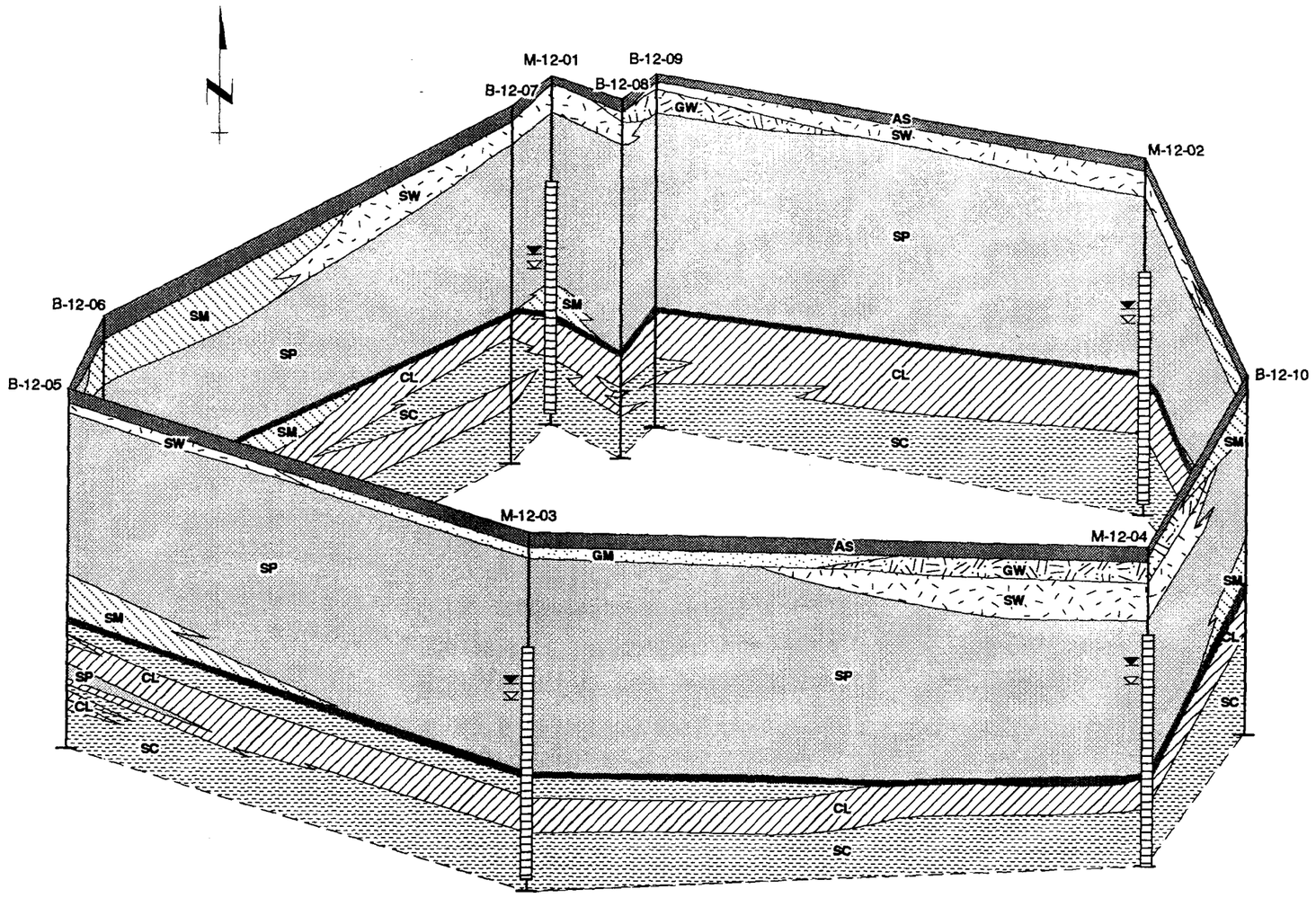
12.3.1 Site Geology/Hydrogeology

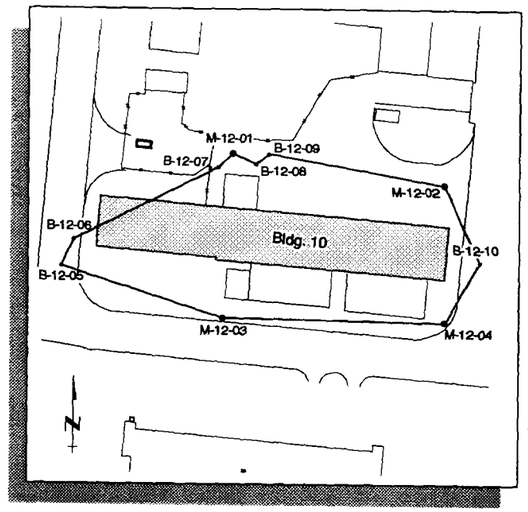
The sediments underlying Site 12 can be divided into two groups: fill material and native sediments. Asphalt overlies all borings and ranges from 1/2 to 1 foot in thick.

The fill material consists of brown unconsolidated fine to medium-grained sand with lenses of silty sand, gravelly sand, or sandy gravel. These lenses are approximately 1/2 to 2 feet thick and are found near the surface or near the bottom of the sand unit. The sand fill extends to depths of 9 to 11.5 feet below land surface. The sand fill is underlain by black to dark gray clay ranging in thickness from 1 to 3 feet. There are silt/sand partings, clayey sand lenses, and some shell fragments found in the clay unit. Underneath the clay to the total depth of each boring drilled at the site is a black to dark gray clayey fine to medium-grained sand containing shell fragments. The native unit is believed to be the Holocene Bay Mud.

Geotechnical results are summarized on Table 12-1. The geotechnical results indicate that the fill sand had a hydraulic conductivity in the range of 2.33E-04 to 2.52E-04 cm/s and the deeper native clayey sand had a hydraulic conductivity of 4.83E-07. Geotechnical laboratory data are found in Appendix D. Figure 12-2 is a fence diagram of the Site 12 subsurface lithology.

Four shallow monitoring wells were installed around the site. The monitoring wells have screens 10 feet in length and intercept the sand fill, clay, and clayey sand units that constitute the upper portion of the shallow water table aquifer.





LEGEND:

- GW Sandy Gravel
- GM Silty Gravel
- SW Gravelly Sand
- SP Sand
- SC Clayey Sand
- SM Silty Sand
- CL Clay
- AS Asphalt
- Approximate Fill/Native Sediment Interface
- First Water During Drilling
- Water Level During Water Sampling
- Monitoring Well
- Screened Interval

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 12
FENCE DIAGRAM

FIGURE 12-2

TABLE 12-1

SITE 12
BUILDING 10
POWER PLANT
GEOTECHNICAL SAMPLE LABORATORY TEST RESULTS

Sample No.	Depth (ft)	Soil Classification Laboratory	Soil Classification Field	Moisture Content (%)	Dry Density (pcf)	Specific Gravity	CEC (meq/100g)	TOC (%w/w)	Permeability Effective Stresses (psi)	Permeability Hydraulic Conductivity (cm/s)
B-12-01	8.5-9	NA	SP	20.0	102.5	NA	8.0	NA	NA	NA
B-12-02	8.5-9	NA	SP	22.0	96.0	2.73	15.7	< 0.1	5	2.33E-04
B-12-02	13-13.5	SP/SC	SC	NA	NA	NA	NA	NA	NA	NA
B-12-03	5.5-6	NA	SP	NA	NA	NA	NA	< 0.1	NA	NA
B-12-03	8.5-9	NA	SP	NA	NA	NA	16.4	NA	NA	NA
B-12-03	13-13.5	NA	SC	61.0	61.0	NA	NA	NA	6	4.83E-07
B-12-04	5.5-6	SW	SP	NA	NA	NA	NA	NA	NA	NA
B-12-05	13.5-14	CL	CL/SC	NA	NA	NA	NA	0.8	NA	NA
B-12-06	7.5-8	NA	SP	19.5	99.0	NA	NA	NA	NA	NA
B-12-08	8.5-9	SP	SP	18.5	98.0	NA	NA	NA	5	2.52E-04

NA - Not Analyzed
Parameters not detectect are reported as less than method detection limit.

Laboratory Methods (Units):
- Soil Classification - Unified Soil Classification System (USCS) - ASTM D2488
- Moisture Content - ASTM D2216 (percent)
- Dry Density - ASTM D2937 (pounds per cubic foot)
- Specific Gravity - ASTM D854
- Cation Exchange Capacity (CEC) - EPA 9080 (milliequivalents per 100 grams)
- Total Organic Carbon (TOC) - Walkey and Black (percent of wet weight)
- Effective Stress - EPA 9100 (pounds per square inch)
- Hydraulic Conductivity - EPA 9100 (centimeters per second)

In-situ permeability (slug) tests were conducted in the wells at Site 12. The hydraulic conductivities as determined by the Bouwer and Rice method for rising-head tests ranged from 1.2E-03 cm/sec to 2.6E-04 cm/sec (Bouwer and Rice, 1976; Bouwer, 1989).

Groundwater levels were measured over a period of four months. The water table elevations ranged from 2.1 to 4.2 feet above mean sea level (MSL) and were fairly consistent within each measuring round. Table 12-2 presents the collected water level data. On November 22 and December 5, 1991, water levels were measured two to three times during the tidal cycle. Based upon these data, it does not appear that these wells are influenced by fluctuation in the tides. A water table contour map was constructed using November 22, 1991, water level measurements and is shown on Figure 12-3. Based upon these contours, the groundwater flow is in the north and westerly direction under a gradient of approximately 0.01 ft/ft.

12.3.2 Analytical Results - Soil Samples

Four soil samples (one surface and three subsurface) were analyzed from each of the 10 boreholes drilled in this investigation. A total of 44 soil samples were collected from the borings at Site 12. Four of the samples are duplicates of samples B-12-01-14, B-12-03-11, B-12-06-08, and B-12-10-00. Surface samples were analyzed for SVOCs, pesticides/PCBs, TRPH, and metals. Subsurface soil samples were analyzed for these constituents as well as VOCs and EDB. Analytical methods are described in Section 4.0. Laboratory QC data are summarized in the QCSR. Analytical results are presented in tables at the end of this section.

Selected samples were also analyzed for pH and TOC. These data will be used in the feasibility study portion of the project and are presented in Appendix B.

12.3.2.1 Volatile Organic Compounds. Acetone, methyl ethyl ketone (MEK), and methylene chloride were identified in the subsurface soils.

MEK was detected in the soil sample collected from 10 feet from boring B-12-04 at a concentration of 23 µg/kg.

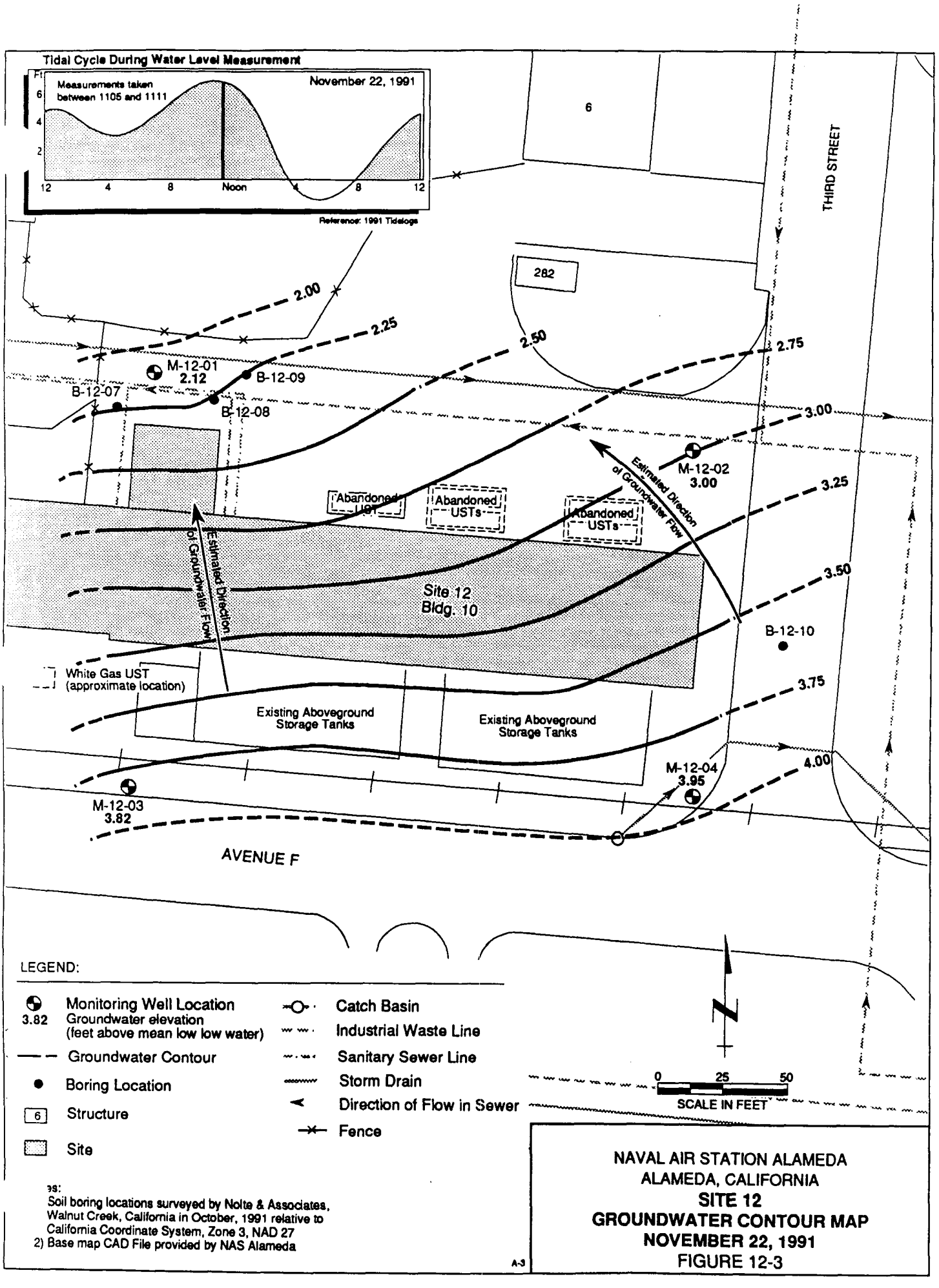
Methylene chloride was detected in five soil samples at concentrations ranging from 5.4 to 9.0 µg/kg. Three of the detections were in soil samples collected from well M-12-03 at depths ranging from 4 to 14 feet. The other two detections were in wells M-12-06, and M-12-10 from samples collected from 8 feet.

TABLE 12-2

SITE 12
BUILDING 10
POWER PLANT
WATER LEVEL DATA

		Date	Time	Water Level in feet	Water Elevation in feet
M12-01					
ToC	*11.56*	11/22/91	920	9.44	2.12
		11/22/91	1105	9.44	2.12
		11/22/91	1220	9.44	2.12
		12/5/91	1046	9.46	2.10
		12/5/91	1149	9.43	2.13
M12-02					
ToC	*10.94*	11/22/91	923	7.96	2.98
		11/22/91	1106	7.94	3.00
		11/22/91	1223	7.90	3.04
		12/5/91	1044	7.94	3.00
		12/5/91	1145	7.94	3.00
M12-03					
ToC	*10.72*	11/22/91	929	6.90	3.82
		11/22/91	1111	6.90	3.82
		11/22/91	1230	6.88	3.84
		12/5/91	1041	6.93	3.79
		12/5/91	1138	6.92	3.80
M12-04					
ToC	*10.60*	11/22/91	927	6.63	3.97
		11/22/91	1108	6.65	3.95
		11/22/91	1226	6.62	3.98
		12/5/91	1039	6.67	3.93
		12/5/91	1141	6.68	3.92

ToC - Top of Casing
Elevation datum - USGS Mean Low Low Water


Tidal Cycle During Water Level Measurement
Measurements taken between 1105 and 1111
November 22, 1991
Ft
6
4
2
12
4
8
Noon
4
8
12
Reference: 1991 Tidelogs
6
THIRD STREET
282
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
M-12-01
2.12
B-12-09
B-12-07
B-12-08
M-12-02
3.00
Abandoned UST
Abandoned USTs
Abandoned USTs
Estimated Direction of Groundwater Flow
Estimated Direction of Groundwater Flow
Site 12
Bldg. 10
B-12-10
White Gas UST
(approximate location)
Existing Aboveground Storage Tanks
Existing Aboveground Storage Tanks
M-12-04
3.95
M-12-03
3.82
AVENUE F
LEGEND:
Monitoring Well Location
3.82 Groundwater elevation (feet above mean low low water)
Groundwater Contour
Boring Location
6 Structure
Site
Catch Basin
Industrial Waste Line
Sanitary Sewer Line
Storm Drain
Direction of Flow in Sewer
Fence
0
25
50
SCALE IN FEET
NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 12
GROUNDWATER CONTOUR MAP
NOVEMBER 22, 1991
FIGURE 12-3
Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda
A-3

Acetone was detected in one method blank for samples collected at the site. After data qualification, acetone is considered not detected for the eight samples in the batch. Qualified data are flagged in Table 12-3 (see Section 3.0 for discussion). The remaining seven samples are considered valid detections of acetone.

Carbon disulfide was identified in three samples at concentrations ranging from 6.3 to 45 µg/kg. It was detected in the sample collected from 9.5 feet in boring M-12-02 and in the samples collected from 9.5 and 12.5 feet in boring M-12-04.

12.3.2.2 Semivolatile Organic Compounds. A distinctive suite of PAH was encountered in the native soil and in the overlying sandy fill.

Bis (2-ethylhexyl) phthalate was reported for many of the samples at Site 12. The compound was also reported in the method blanks for both batches used for this site. Based on data qualification (Section 3.0), bis (2-ethylhexyl) phthalate is considered not detected for all of the samples at this site. Qualified data are identified in Table 12-3.

12.3.2.3 Total Recoverable Petroleum Hydrocarbons. As discussed in Section 2.0, the TRPH analysis used in this investigation identifies all petroleum hydrocarbons in the C4 to C50 range. TRPH were detected in 19 samples at concentrations ranging from 30.7 to 20,500 mg/kg. Twelve of the 19 samples, with TRPH detections, were collected at the surface (directly below the asphalt). TRPH was detected in the subsurface in borings M-12-03, M-12-04, and B-12-07.

12.3.2.4 Metals. As discussed in Section 3.0 of this report, background data for metals in soils at the base have not yet been collected. Background data for metals in soil will be collected prior to the Phase 7 comprehensive RI planned for NAS Alameda. Determination of the location and extent of possible metals contamination will be conducted after the planned collection of background soil samples. As discussed in Section 3.0, the metals beryllium, chromium, copper, lead, mercury, and nickel have been tentatively identified as metals of concern. Analytical results for these metals are presented below. Results for all metals analyzed for are presented in Table 12-4.

Beryllium was detected in 39 samples at concentrations ranging from 0.133 to 2.29 mg/kg. The highest concentration was identified in the surface sample from boring B-12-08.

Total chromium was detected in 44 samples at concentrations ranging from 12.9 to 85.8 mg/kg. The highest concentration of total chromium was detected in the sample collected at 11-feet from boring M-12-03.

Copper was detected in 44 samples at concentrations ranging from 3.46 to 50.7 mg/kg. The highest concentration of copper was detected in the sample collected at 11-feet from boring M-12-03.

Lead was detected in 44 samples at concentrations ranging from 1.82 to 48.3 mg/kg. The highest concentration of lead was detected in the surface sample collected boring M-12-04.

Mercury was detected in 19 samples at concentrations ranging from 0.061 to 1.91 mg/kg. The highest concentration of mercury was detected in the sample collected at 9.5-feet from boring M-12-02.

Nickel was detected in 44 samples at concentrations ranging from 9.31 to 87.5 mg/kg. The highest concentration of nickel was detected in the sample collected at 9.5-feet from boring M-12-04.

12.3.2.5 Pesticides/PCBs. The pesticide Aldrin was detected at low levels in two surface soil samples. The presence of Aldrin may be related to past spraying of pesticides around buildings.

12.3.3 Analytical Results - Groundwater Samples

Four groundwater samples and one duplicate were collected at Site 12. Samples were analyzed for VOCs, SVOCs, pesticides/PCBs, TRPH, EDB, and metals. All groundwater data are presented in tables at the end of this section. Concentrations of detected organic compounds are presented in Table 12-5 and concentrations of detected metals are presented in Table 12-6. General chemical data including physical parameters, pH, TOC, and anion concentrations are presented in Table 12-7.

12.3.3.1 Volatile Organic Compounds. Acetone, methylene chloride, and 1,2-dichloroethene were detected in low concentrations in three of the four groundwater samples. Review of the water quality control data showed no chemical detections in the method blanks, indicating that the laboratory procedures are not a source of these chemicals. The source of these VOCs is unknown.

12.3.3.2 Semivolatile Organic Compounds. Low concentrations of the PAH acenaphthene, fluoranthene, phenanthrene, and pyrene were detected in wells M-12-02, M-12-03, and M-12-04. These compounds are in the suite of PAH which appear to occur basewide (Section 3.0). They are also

highly insoluble in water. As the water samples from this site are turbid, the probable source for the detected PAH is material adhering to particulates in these samples.

Bis (2-chloroethyl) ether was detected in well M-12-03. The source of this compound is unknown.

12.3.3.3 Total Recoverable Petroleum Hydrocarbons. TRPH was not detected in the groundwater samples from Site 12.

12.3.3.4 Metals. Manganese concentrations in all of the Site 12 wells were greater than the EPA chronic marine WQC. The attenuated concentrations of manganese in all of the wells are equal to or below the chronic WQC. The copper concentration in well M-12-02 exceeds the EPA acute marine criteria of 2.9 µg/L. However, when attenuated, the concentration does not exceed the WQC.

The detection limits for mercury, nickel, and silver exceed EPA marine WQC. Thus, it is not known whether these metals are present in excess of the WQC in these wells. However, if the metals were present at levels below the detection limits, their attenuated values would always be less than the WQC.

12.3.3.5 Pesticides/PCBs. No pesticides or PCBs were detected in the groundwater samples from Site 12.

12.3.3.6 General Chemicals. Total dissolved solids range from 1,040 to 6,800 mg/L at Site 12 indicating the groundwater is brackish (Driscoll, 1987). The MCL for chloride of 250 mg/L is exceeded in three of the four wells. The groundwater pH is neutral.

TABLE 12-3
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B12-01-000	B12-01-004	B12-01-010	B12-01-014	Duplicate B12-01-014	B12-02-000	B12-02-004
Date Sampled	07/25/91	07/25/91	07/25/91	07/25/91	07/25/91	07/25/91	07/25/91
Depth of Sample	0.0 ft	3.5 ft	9.5 ft	14.0 ft	14.0 ft	0.0 ft	3.5 ft
PARAMETER REPORTED							
VOLATILE ORGANICS (µg/kg-dry)							
ACETONE	NA	11	14	31	15	NA	< 11
CARBON DISULFIDE	NA	< 5.2	< 6.2	< 6.3	< 6.2	NA	< 5.3
METHYL ETHYL KETONE	NA	< 10.0	< 12	< 13	< 12	NA	< 11
METHYLENE CHLORIDE	NA	< 5.2	< 6.2	< 6.3	< 6.2	NA	< 5.3
SEMIVOLATILE ORGANICS (µg/kg-dry)							
2-METHYLNAPHTHALENE	< 520	< 100	< 120	< 130	< 120	< 520	< 2100
ACENAPHTHYLENE	< 420	< 84	< 98	< 100	< 100	< 410	< 1700
ANTHRACENE	< 420	< 84	< 98	< 100	< 100	< 410	< 1700
BENZO(A)ANTHRACENE	< 520	< 100	< 120	< 130	< 120	< 520	< 2100
BENZO(A)PYRENE	< 730	< 150	< 170	< 180	180	< 720	< 3000
BENZO(B)FLUORANTHENE	< 520	< 100	< 120	< 130	130	< 520	< 2100
BENZO(GHI)PERYLENE	< 840	< 170	< 200	< 200	< 200	< 830	< 3400
BENZO(K)FLUORANTHENE	< 520	< 100	< 120	< 130	< 120	< 520	< 2100
BIS(2-ETHYLHEXYL)PHTHALATE	< 520	< 100	< 120	< 130	< 120	< 520	< 2100
CHRYSENE	< 520	< 100	< 120	< 130	< 120	< 520	< 2100
DIBEN(A,H)ANTHRACENE	< 840	< 170	< 200	< 200	< 200	< 830	< 3400
FLUORANTHENE	< 420	< 84	< 98	160	< 100	< 410	< 1700
INDENO(1,2,3-CD)PYRENE	< 840	< 170	< 200	< 200	< 200	< 830	< 3400
NAPHTHALENE	< 420	< 84	< 98	< 100	< 100	< 410	< 1700
PHENANTHRENE	< 420	< 84	< 98	< 100	< 100	< 410	< 1700
PYRENE	< 420	< 84	< 98	360	250	< 410	< 1700
PESTICIDES/PCBS (µg/kg-dry)							
Aldrin	< 3.49	< 3.48	< 4.10	< 4.18	< 4.16	8.28	< 3.53
TOTAL PETRO. HYDROCARBONS (mg/kg-dry)							
HYDROCARBONS,PETROL	2390	< 29.5	< 34.7	< 35.4	< 35.2	4020	< 29.9

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected, J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
< = Analyte reported bleow detection limit

TABLE 12-3
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B12-02-010	B12-02-014	B12-03-000	B12-03-004	B12-03-011	Duplicate B12-03-011	B12-03-014
Date Sampled	07/25/91	07/25/91	07/26/91	07/26/91	07/26/91	07/26/91	07/26/91
Depth of Sample	9.5 ft	14.0 ft	0.0 ft	3.5 ft	11.0 ft	11.0 ft	14.0 ft
PARAMETER REPORTED							
VOLATILE ORGANICS (µg/kg-dry)							
ACETONE	60	22	NA	< 10.0	< 18	37	< 12
CARBON DISULFIDE	19	< 6.4	NA	< 5.2	< 8.9	< 8.7	< 6.2
METHYL ETHYL KETONE	< 15	< 13	NA	< 10.0	< 18	< 17	< 12
METHYLENE CHLORIDE	< 7.6	< 6.4	NA	5.4	9.0	< 8.7	6.4
SEMIVOLATILE ORGANICS (µg/kg-dry)							
2-METHYLNAPHTHALENE	< 760	< 130	< 210	< 100	< 360	< 350	< 120
ACENAPHTHYLENE	< 610	< 100	< 160	< 84	< 290	< 280	< 99
ANTHRACENE	< 610	< 100	< 160	< 84	< 290	< 280	< 99
BENZO(A)ANTHRACENE	1100	< 130	< 210	< 100	1100	1300	180
BENZO(A)PYRENE	5100	< 180	< 290	< 150	5900	7900	620
BENZO(B)FLUORANTHENE	2600	150	< 210	< 100	4100	6400	770
BENZO(GHI)PERYLENE	5700	< 200	< 330	< 170	< 570	< 560	< 200
BENZO(K)FLUORANTHENE	2700	< 130	< 210	< 100	2100	2400	130
BIS(2-ETHYLHEXYL)PHTHALATE	< 760	180	< 210	< 100	< 360	< 350	< 120
CHRYSENE	1400	< 130	< 210	< 100	1200	1700	170
DIBEN(A,H)ANTHRACENE	< 1200	< 200	< 330	< 170	< 570	< 560	< 200
FLUORANTHENE	2200	120	< 160	< 84	3000	3900	430
INDENO(1,2,3-CD)PYRENE	3700	< 200	< 330	< 170	< 570	3700	< 200
NAPHTHALENE	< 610	< 100	< 160	< 84	< 290	320	< 99
PHENANTHRENE	< 610	< 100	< 160	< 84	460	610	170
PYRENE	10000	150	< 160	< 84	15000	22000	1800
PESTICIDES/PCBS (µg/kg-dry)							
Aldrin	< 5.07	< 4.24	6.09	< 3.50	< 5.94	< 5.82	< 4.13
TOTAL PETRO. HYDROCARBONS (mg/kg-dry)							
HYDROCARBONS,PETROL	44.5	< 35.8	730	30.7	69.5	156	< 34.9

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected, J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
< = Analyte reported bleow detection limit

TABLE 12-3
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B12-04-000	B12-04-004	B12-04-010	B12-04-013	B12-05-000	B12-05-005	B12-05-008
Date Sampled	07/26/91	07/26/91	07/26/91	07/26/91	08/12/91	08/12/91	08/12/91
Depth of Sample	0.0 ft	4.0 ft	9.5 ft	12.5 ft	0.0 ft	5.0 ft	8.0 ft
PARAMETER REPORTED							
VOLATILE ORGANICS (µg/kg-dry)							
ACETONE	NA	< 11	250	28	NA	< 11	< 12
CARBON DISULFIDE	NA	< 5.4	45	6.3	NA	< 5.3	< 6.1
METHYL ETHYL KETONE	NA	< 11	23	< 13	NA	< 11	< 12
METHYLENE CHLORIDE	NA	< 5.4	< 8.4	< 6.3	NA	< 5.3	< 6.1
SEMIVOLATILE ORGANICS (µg/kg-dry)							
2-METHYLNAPHTHALENE	< 210	< 110	< 330	< 130	< 100	< 110	< 120
ACENAPHTHYLENE	< 170	< 86	< 270	170	< 84	< 85	< 98
ANTHRACENE	< 170	< 86	< 270	170	< 84	< 85	< 98
BENZO(A)ANTHRACENE	< 210	< 110	1200	460	< 100	< 110	< 120
BENZO(A)PYRENE	< 290	< 150	5400	1100	< 150	< 150	< 170
BENZO(B)FLUORANTHENE	< 210	< 110	4600	1200	< 100	< 110	< 120
BENZO(GHI)PERYLENE	< 330	< 170	< 540	< 200	< 170	< 170	< 200
BENZO(K)FLUORANTHENE	< 210	< 110	1700	400	< 100	< 110	< 120
BIS(2-ETHYLHEXYL)PHTHALATE	< 210	< 110	< 330	< 130	< 100	170	230
CHRYSENE	< 210	< 110	1700	590	< 100	< 110	< 120
DIBEN(A,H)ANTHRACENE	< 330	< 170	< 540	< 200	< 170	< 170	< 200
FLUORANTHENE	< 170	< 86	3360	1400	< 84	< 85	< 98
INDENO(1,2,3-CD)PYRENE	< 330	< 170	< 540	< 200	< 170	< 170	< 200
NAPHTHALENE	< 170	< 86	440	< 100	< 84	< 85	< 98
PHENANTHRENE	< 170	< 86	660	940	< 84	< 85	< 98
PYRENE	< 170	< 86	18000	3200	< 84	< 85	< 98
PESTICIDES/PCBS (µg/kg-dry)							
Aldrin	< 3.44	< 3.59	< 5.57	< 4.20	< 3.49	< 3.54	< 4.10
TOTAL PETRO. HYDROCARBONS (mg/kg-dry)							
HYDROCARBONS,PETROL	10700	85.1	< 47.1	< 35.5	573	< 29.9	< 34.6

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected, J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
< = Analyte reported bleow detection limit

TABLE 12-3
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B12-05-014	B12-06-000	B12-06-005	B12-06-008	Duplicate B12-06-008	B12-06-014	B12-07-000
Date Sampled	08/12/91	08/12/91	08/12/91	08/12/91	08/12/91	08/12/91	07/25/91
Depth of Sample	14.0 ft	0.0 ft	5.0 ft	8.0 ft	8.0 ft	14.0 ft	0.0 ft
PARAMETER REPORTED							
VOLATILE ORGANICS (µg/kg-dry)							
ACETONE	< 12	NA	< 10.0	< 12	< 12	< 12	NA
CARBON DISULFIDE	< 6.1	NA	< 5.2	< 6.1	< 6.1	< 6.1	NA
METHYL ETHYL KETONE	< 12	NA	< 10.0	< 12	< 12	< 12	NA
METHYLENE CHLORIDE	< 6.1	NA	< 5.2	6.5	< 6.1	< 6.1	NA
SEMIVOLATILE ORGANICS (µg/kg-dry)							
2-METHYLNAPHTHALENE	< 120	< 110	< 100	< 120	< 120	< 610	< 210
ACENAPHTHYLENE	130	< 85	< 84	< 97	< 97	< 490	< 170
ANTHRACENE	170	< 85	< 84	< 97	< 97	< 490	< 170
BENZO(A)ANTHRACENE	1900	< 110	< 100	< 120	< 120	4400	< 210
BENZO(A)PYRENE	2700	< 150	< 150	< 170	< 170	6600	< 290
BENZO(B)FLUORANTHENE	2200	< 110	< 100	< 120	< 120	3600	< 210
BENZO(GHI)PERYLENE	3400	< 170	< 170	< 190	< 190	4100	< 330
BENZO(K)FLUORANTHENE	630	< 110	< 100	< 120	< 120	4300	< 210
BIS(2-ETHYLHEXYL)PHTHALATE	160	< 110	220UJ	160UJ	< 120	1100UJ	370UJ
CHRYSENE	1800	< 110	< 100	< 120	< 120	5500	< 210
DIBEN(A,H)ANTHRACENE	320	< 170	< 170	< 190	< 190	< 980	< 330
FLUORANTHENE	3000	< 85	< 84	< 97	< 97	11000	< 170
INDENO(1,2,3-CD)PYRENE	2500	< 170	< 170	< 190	< 190	3300	< 330
NAPHTHALENE	120	< 85	< 84	< 97	< 97	< 490	< 170
PHENANTHRENE	500	< 85	< 84	< 97	< 97	920	< 170
PYRENE	7600	< 85	< 84	< 97	< 97	19000	< 170
PESTICIDES/PCBS (µg/kg-dry)							
Aldrin	< 4.06	< 3.53	< 3.49	< 4.06	< 4.06	< 4.08	< 3.47
TOTAL PETRO. HYDROCARBONS (mg/kg-dry)							
HYDROCARBONS,PETROL	< 34.3	1540	< 29.5	< 34.3	< 34.4	< 34.5	2380

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected, J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
< = Analyte reported bleow detection limit

TABLE 12-3
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B12-07-004	B12-07-010	B12-07-014	B12-08-000	B12-08-004	B12-08-012	B12-08-014
Date Sampled	07/25/91	07/25/91	07/25/91	07/24/91	07/24/91	07/24/91	07/24/91
Depth of Sample	3.5 ft	9.5 ft	14.0 ft	0.0 ft	3.5 ft	9.5 ft	14.0 ft
PARAMETER REPORTED							
VOLATILE ORGANICS (µg/kg-dry)							
ACETONE	< 11	33	32	NA	< 11	< 12	< 12
CARBON DISULFIDE	< 5.3	< 6.6	< 6.0	NA	< 5.3	< 6.2	< 6.1
METHYL ETHYL KETONE	< 11	< 13	< 12	NA	< 11	< 12	< 12
METHYLENE CHLORIDE	< 5.3	< 6.6	< 6.0	NA	< 5.3	< 6.2	< 6.1
SEMIVOLATILE ORGANICS (µg/kg-dry)							
2-METHYLNAPHTHALENE	< 110	< 130	< 120	< 100	< 110	< 120	< 120
ACENAPHTHYLENE	< 85	< 110	< 97	< 82	< 86	< 99	< 98
ANTHRACENE	< 85	< 110	< 97	< 82	< 86	< 99	< 98
BENZO(A)ANTHRACENE	< 110	< 130	650	< 100	< 110	< 120	150
BENZO(A)PYRENE	< 150	< 180	1100	< 140	< 150	< 170	310
BENZO(B)FLUORANTHENE	< 110	220	1100	< 100	< 110	< 120	260J
BENZO(GHI)PERYLENE	< 170	< 210	< 190	< 160	< 170	< 200	300J
BENZO(K)FLUORANTHENE	< 110	< 130	340	< 100	< 110	< 120	< 120
BIS(2-ETHYLHEXYL)PHTHALATE	< 110	< 130	< 120	130J	< 110	< 120	< 120
CHRYSENE	< 110	< 130	570	< 100	< 110	< 120	160J
DIBEN(A,H)ANTHRACENE	< 170	< 210	< 190	< 160	< 170	< 200	< 200
FLUORANTHENE	< 85	410	1000	< 82	< 86	< 99	280J
INDENO(1,2,3-CD)PYRENE	< 170	< 210	< 190	< 160	< 170	< 200	220J
NAPHTHALENE	< 85	< 110	< 97	< 82	< 86	< 99	< 98
PHENANTHRENE	< 85	260	370	< 82	< 86	< 99	< 98
PYRENE	< 85	680	2100	< 82	< 86	< 99	580J
PESTICIDES/PCBS (µg/kg-dry)							
Aldrin	< 3.55	< 4.39	< 4.03	< 3.42	< 3.57	< 4.13	< 4.07
TOTAL PETRO. HYDROCARBONS (mg/kg-dry)							
HYDROCARBONS,PETROL	< 30.0	90.8	83.2	31.1	32.4	< 34.9	< 34.5

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected, J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
< = Analyte reported bleow detection limit

TABLE 12-3
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B12-09-000	B12-09-004	B12-09-010	B12-09-014	B12-10-000	Duplicate B12-10-000	B12-10-002
Date Sampled	07/24/91	07/24/91	07/24/91	07/24/91	08/05/91	08/05/91	08/05/91
Depth of Sample	0.0 ft	3.5 ft	9.5 ft	14.0 ft	0.0 ft	0.0 ft	2.0 ft
PARAMETER REPORTED							
VOLATILE ORGANICS (µg/kg-dry)							
ACETONE	NA	< 11	< 12	27	NA	NA	12UJ
CARBON DISULFIDE	NA	< 5.5	< 6.2	< 6.4	NA	NA	< 5.1
METHYL ETHYL KETONE	NA	< 11	< 12	< 13	NA	NA	< 10.0
METHYLENE CHLORIDE	NA	< 5.5	< 6.2	< 6.4	NA	NA	< 5.1
SEMIVOLATILE ORGANICS (µg/kg-dry)							
2-METHYLNAPHTHALENE	< 100	< 110	< 120	< 130	830	920	< 100
ACENAPHTHYLENE	< 82	< 88	< 99	< 100	< 410	< 410	< 82
ANTHRACENE	< 82	< 88	< 99	< 100	< 410	< 410	< 82
BENZO(A)ANTHRACENE	< 100	< 110	< 120	370J	850	800	< 100
BENZO(A)PYRENE	< 140	< 150	< 170	800J	< 720	< 720	< 140
BENZO(B)FLUORANTHENE	< 100	< 110	< 120	770J	850	730	< 100
BENZO(GHI)PERYLENE	< 160	< 180	< 200	< 200	< 830	< 830	< 160
BENZO(K)FLUORANTHENE	< 100	< 110	< 120	280J	< 520	< 520	< 100
BIS(2-ETHYLHEXYL)PHTHALATE	< 100	< 110	< 120	< 130	< 520	< 520	< 100
CHRYSENE	140J	< 110	< 120	360J	790	930	< 100
DIBEN(A,H)ANTHRACENE	< 160	< 180	< 200	< 200	< 830	< 830	< 160
FLUORANTHENE	< 82	< 88	< 99	730J	1200	890	< 82
INDENO(1,2,3-CD)PYRENE	< 160	< 180	< 200	< 200	< 830	< 830	< 160
NAPHTHALENE	< 82	< 88	< 99	< 100	860	1000	< 82
PHENANTHRENE	< 82	< 88	< 99	220J	1700	1500	< 82
PYRENE	< 82	< 88	< 99	1300J	760	1100	< 82
PESTICIDES/PCBS (µg/kg-dry)							
Aldrin	< 3.44	< 3.68	< 4.14	< 4.26	< 3.45	< 3.44	< 3.43
TOTAL PETRO. HYDROCARBONS (mg/kg-dry)							
HYDROCARBONS,PETROL	1750	< 31.2	< 35.0	< 36.0	16500J	20500J	< 29.0UJ

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected, J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
< = Analyte reported bleow detection limit

TABLE 12-3
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B12-10-008	B12-10-014
Date Sampled	08/05/91	08/05/91
Depth of Sample	8.0 ft	14.0 ft
PARAMETER REPORTED		
VOLATILE ORGANICS (µg/kg-dry)		
ACETONE	47UJ	41UJ
CARBON DISULFIDE	< 6.2	< 6.4
METHYL ETHYL KETONE	< 12	< 13
METHYLENE CHLORIDE	7.3	< 6.4
SEMIVOLATILE ORGANICS (µg/kg-dry)		
2-METHYLNAPHTHALENE	< 120	< 130
ACENAPHTHYLENE	< 100	< 100
ANTHRACENE	< 100	< 100
BENZO(A)ANTHRACENE	< 120	< 130
BENZO(A)PYRENE	< 170	< 180
BENZO(B)FLUORANTHENE	< 120	< 130
BENZO(GHI)PERYLENE	< 200	< 210
BENZO(K)FLUORANTHENE	< 120	< 130
BIS(2-ETHYLHEXYL)PHTHALATE	< 120	140
CHRYSENE	< 120	< 130
DIBEN(A,H)ANTHRACENE	< 200	< 210
FLUORANTHENE	< 100	< 100
INDENO(1,2,3-CD)PYRENE	< 200	< 210
NAPHTHALENE	< 100	< 100
PHENANTHRENE	< 100	< 100
PYRENE	< 100	< 100
PESTICIDES/PCBS (µg/kg-dry)		
Aldrin	< 4.16	< 4.29
TOTAL PETRO. HYDROCARBONS (mg/kg-dry)		
HYDROCARBONS,PETROL	< 35.2UJ	< 36.3UJ

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected, J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.
< = Analyte reported bleow detection limit

TABLE 12-4
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B12-01-000	B12-01-004	B12-01-010	B12-01-014	Duplicate B12-01-014	B12-02-000	B12-02-004	B12-02-010
Date Sampled	07/25/91	07/25/91	07/25/91	07/25/91	07/25/91	07/25/91	07/25/91	07/25/91
Depth of Sample	0.0 ft	3.5 ft	9.5 ft	14.0 ft	14.0 ft	0.0 ft	3.5 ft	9.5 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	6720J	4100J	4650J	3090J	4800J	12200J	5280J	13800J
ANTIMONY	3.7J	2.7J	3.6J	< 2.9UJ	4.0J	3.8J	3.6J	6.0J
ARSENIC	2.66	1.63	1.72	3.11	3.16	0.966	1.83	7.81
BARIUM	72.1J	20.3J	44.9J	10.5J	11.9J	57.3J	69.4J	98.0J
BERYLLIUM	0.568	0.495	0.477	0.271	0.479	0.558	0.543	0.239
CADMIUM	< 0.281	< 0.273	< 0.344	< 0.343	< 0.337	< 0.268	< 0.295	< 0.425
CALCIUM	5320J	2050J	1970J	5160J	5710J	7170J	3730J	3360J
CHROMIUM, TOTAL	13.8J	25.2J	27.4J	14.2J	22.1J	19.2J	29.4J	64.0J
COBALT	7.07	4.28	4.95	3.60	5.04	16.7	4.92	15.4
COPPER	8.54J	4.45J	4.56J	3.46J	8.89J	33.2J	5.16J	38.4J
IRON	13200J	7350J	8130J	4810J	8510J	14000J	8410J	25800J
LEAD	6.21	2.25	2.50	3.91	5.62	17.5	1.96	35.4
MAGNESIUM	3130	1910	2240	1430	2780	5370	2020	8290
MANGANESE	352J	80.9J	99.7J	57.8J	85.2J	310J	80.2J	372J
MERCURY	0.153	< 0.046	< 0.061	0.069	0.067	< 0.050	< 0.049	1.91
NICKEL	16.2J	22.4J	24.7J	10.4J	22.2J	28.5J	26.2J	78.6J
POTASSIUM	1310J	659J	866J	735J	1040J	1220J	677J	3910J
SELENIUM	< 0.186UJ	< 0.195UJ	< 0.256UJ	0.224UJ	< 0.232UJ	< 0.985UJ	< 0.217UJ	< 0.317UJ
SILVER	0.573	0.568	0.731	0.569	0.668	0.917	0.617	0.735
SODIUM	310J	426J	625J	1570J	2500J	843J	337J	2210J
THALLIUM	< 0.240	< 0.250	< 0.329	< 0.288	< 0.299	< 0.253	< 0.279	< 0.407
VANADIUM	22.2J	18.0J	19.7J	12.2J	20.3J	37.0J	20.9J	53.4J
ZINC	40.7J	14.9J	16.9J	10.2J	22.9J	30.5J	15.6J	98.6J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 12-4
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B12-02-014	B12-03-000	B12-03-004	B12-03-011	Duplicate B12-03-011	B12-03-014	B12-04-000	B12-04-004
Date Sampled	07/25/91	07/26/91	07/26/91	07/26/91	07/26/91	07/26/91	07/26/91	07/26/91
Depth of Sample	14.0 ft	0.0 ft	3.5 ft	11.0 ft	11.0 ft	14.0 ft	0.0 ft	4.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	4990J	11600	3600	13300	22300	2760	10300	5560
ANTIMONY	4.0J	4.6	< 2.6	4.6	6.2	< 2.8	2.7	< 2.7
ARSENIC	3.92	3.46	1.53	5.99	8.80	3.01	1.98	1.28
BARIUM	15.7J	84.3J	25.8J	127J	92.1J	8.73J	69.4J	93.3J
BERYLLIUM	0.415	0.592	0.192	0.361	0.845	< 0.143	0.286	0.266
CADMIUM	< 0.328	0.350	< 0.306	0.493	0.659	< 0.329	0.328	< 0.317
CALCIUM	2140J	12900J	1770J	2550J	4060J	1810J	7500J	2620J
CHROMIUM, TOTAL	22.7J	23.6	27.3	52.1	85.8	12.9	27.2	28.6
COBALT	6.12	15.2	4.36	10.1	14.9	2.60	8.77	5.49
COPPER	6.27J	31.8	4.78	31.0	50.7	3.47	28.6	10.6
IRON	10200J	25100J	7130J	22000J	33800J	4650J	15100J	10400J
LEAD	2.27	6.35	1.94	29.0	43.9	2.28	48.3	2.02
MAGNESIUM	3510	7770J	1870J	6900J	10500J	1430J	6480J	2730J
MANGANESE	127J	620J	77.9J	265J	375J	51.6J	345J	125J
MERCURY	< 0.057	0.293	< 0.101	0.390	0.458	< 0.116	< 0.101	< 0.098
NICKEL	23.2J	33.1	23.8	57.6	84.6	10.6	30.3	23.5
POTASSIUM	1210J	631	498	2480	3650	570	730	698
SELENIUM	< 0.248UJ	< 0.206UJ	< 0.216UJ	< 0.330UJ	< 0.350UJ	< 0.231UJ	< 0.200UJ	< 0.215UJ
SILVER	< 0.535	< 0.483	< 0.500	< 0.740	< 0.785	< 0.537	< 0.482	< 0.517
SODIUM	889J	532J	101J	2040J	3540J	1410J	498J	118J
THALLIUM	< 0.319	< 0.265	< 0.277	< 0.424	< 0.450	< 0.297UJ	< 0.257	< 0.276
VANADIUM	18.4J	60.9	17.4	44.9	73.0	10.1	36.8	27.7
ZINC	24.0J	60.6J	15.2J	101J	122J	10.7J	38.7J	17.2J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 12-4
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B12-04-010	B12-04-013	B12-05-000	B12-05-005	B12-05-008	B12-05-014	B12-06-000	B12-06-005
Date Sampled	07/26/91	07/26/91	08/12/91	08/12/91	08/12/91	08/12/91	08/12/91	08/12/91
Depth of Sample	9.5 ft	12.5 ft	0.0 ft	5.0 ft	8.0 ft	14.0 ft	0.0 ft	5.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	20600	7340	5410J	3400J	4410J	1930J	9720J	3370J
ANTIMONY	8.3	< 2.8	< 2.5UJ	< 2.2UJ	< 2.9UJ	< 2.8UJ	2.7J	< 2.3UJ
ARSENIC	6.48	3.40	2.36	1.71	1.43	3.66	1.03	1.45
BARIUM	143J	18.7J	41.4J	28.7J	34.3J	8.59J	35.8J	43.2J
BERYLLIUM	0.746	0.558	0.400	0.307	< 0.150	0.216	0.410	0.133
CADMIUM	0.560	< 0.334	< 0.299	< 0.261	< 0.347	< 0.340	< 0.291	< 0.275
CALCIUM	3820J	6650J	2340J	1310J	1900J	6980J	2590J	1460J
CHROMIUM, TOTAL	85.3	29.9	20.1J	23.4J	25.5J	10.6J	16.0J	24.6J
COBALT	16.7	6.54	5.71J	4.39J	5.56J	3.69J	10.00J	4.09J
COPPER	40.6	12.4	8.24J	4.52J	6.23J	3.52J	32.7J	4.42J
IRON	32900J	13200J	10800J	6880J	8540J	3820J	22300J	6650J
LEAD	39.5	3.42	6.25	2.03	2.01	7.10	1.94	1.82
MAGNESIUM	9700J	3950J	3390J	1960J	2650J	1090J	7160J	1770J
MANGANESE	372J	155J	167J	84.5J	99.4J	46.3J	303J	63.0J
MERCURY	0.804	< 0.117	< 0.101	< 0.103	0.175	< 0.121	< 0.104	< 0.103
NICKEL	87.5	29.5	19.1	23.9	30.8	9.31	9.99	22.0
POTASSIUM	4020	1380	834J	514J	747J	553J	457J	513J
SELENIUM	< 0.346UJ	< 0.230UJ	< 0.215UJ	< 0.217UJ	< 0.253UJ	< 0.251UJ	< 0.220UJ	< 0.214UJ
SILVER	< 0.793	< 0.545	0.529	< 0.426	< 0.566	< 0.556	0.521	< 0.449
SODIUM	2830J	1220J	522J	224J	251J	798J	886J	273J
THALLIUM	< 0.445	< 0.296	< 0.277	< 0.279	< 0.325	< 0.323	< 0.283	< 0.275
VANADIUM	69.1	25.6	21.2J	15.3J	18.2J	9.51J	35.1J	15.8J
ZINC	113J	30.5J	18.2J	15.9J	21.2J	11.9J	17.4J	14.4J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 12-4
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B12-06-008	Duplicate B12-06-008	B12-06-014	B12-07-000	B12-07-004	B12-07-010	B12-07-014	B12-08-000
Date Sampled	08/12/91	08/12/91	08/12/91	07/25/91	07/25/91	07/25/91	07/25/91	07/24/91
Depth of Sample	8.0 ft	8.0 ft	14.0 ft	0.0 ft	3.5 ft	9.5 ft	14.0 ft	0.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	4560J	4540J	2590J	8360J	3770J	12600J	3350J	11500J
ANTIMONY	< 2.7UJ	< 3.0UJ	< 2.8UJ	5.0J	3.0J	6.0J	2.9J	7.4
ARSENIC	1.65	1.49	3.67	1.71	1.44	3.75	3.97	7.90
BARIUM	38.1J	41.9J	13.0J	77.9J	23.6J	102J	12.3J	96.0J
BERYLLIUM	0.430	0.163	< 0.143	0.223	< 0.132	0.460	< 0.134	2.29J
CADMIUM	< 0.329	< 0.353	< 0.331	< 0.303	< 0.305	< 0.317	< 0.309	< 0.270
CALCIUM	1880J	1820J	5020J	5670J	1660J	2200J	4740J	7490J
CHROMIUM, TOTAL	24.9J	26.7J	13.6J	24.3J	25.4J	54.8J	16.7J	12.3J
COBALT	5.07J	5.27J	3.46J	40.7	4.47	11.4	4.22	62.1
COPPER	5.50J	5.88J	4.40J	14.8J	4.64J	18.5J	5.86J	10.5
IRON	8460J	8590J	4790J	13400J	7100J	20800J	6380J	26900J
LEAD	2.13	2.08	2.99	12.6	2.12	20.5	7.10	20.8
MAGNESIUM	2630J	2610J	1420J	4950	2030	5590	1770	4010J
MANGANESE	90.3J	93.2J	58.5J	312J	78.4J	223J	90.5J	885J
MERCURY	< 0.119	< 0.118	< 0.122	0.061	< 0.051	0.772	0.062	0.306
NICKEL	29.3	29.4	11.6	35.4J	23.0J	66.7J	13.7J	17.7
POTASSIUM	802J	795J	601J	1640J	661J	2210J	831J	2040
SELENIUM	< 0.244UJ	< 0.245UJ	< 0.252UJ	< 0.203UJ	< 0.196UJ	< 1.22UJ	< 0.213UJ	< 0.195
SILVER	0.659	< 0.577	< 0.540	5.17	< 0.498	0.551	< 0.505	2.61J
SODIUM	250J	318J	790J	560J	381J	1320J	617J	428J
THALLIUM	< 0.314	< 0.314	< 0.323	< 0.262	< 0.252	< 0.313	< 0.274	0.530J
VANADIUM	17.7J	18.5J	11.9J	26.1J	16.3J	42.7J	13.5J	40.3J
ZINC	20.0J	21.1J	11.6J	35.1J	15.9J	51.8J	16.4J	96.3

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 12-4
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B12-08-004	B12-08-012	B12-08-014	B12-09-000	B12-09-004	B12-09-010	B12-09-014	B12-10-000
Date Sampled	07/24/91	07/24/91	07/24/91	07/24/91	07/24/91	07/24/91	07/24/91	08/05/91
Depth of Sample	3.5 ft	9.5 ft	14.0 ft	0.0 ft	3.5 ft	9.5 ft	14.0 ft	0.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	5890J	5870J	3720J	11800J	6310J	5760J	8460J	10400J
ANTIMONY	4.0	5.1	< 2.8	6.6	< 2.6	2.6	6.2	5.6J
ARSENIC	1.88	1.59	3.12	2.77	1.90	1.69	4.06	2.44
BARIUM	30.2J	54.6J	10.9J	94.2J	53.9J	43.6J	27.7J	103J
BERYLLIUM	0.954J	1.05J	0.248J	0.524J	0.564J	0.455J	0.480J	1.24
CADMIUM	< 0.297	< 0.331	< 0.340	< 0.281	< 0.305	< 0.308	< 0.318	< 0.284
CALCIUM	2630J	2350J	10500J	8570J	2890J	2390J	4290J	4340J
CHROMIUM, TOTAL	36.4J	34.3J	15.9J	25.9J	34.0J	30.6J	38.7J	40.9
COBALT	5.68	6.55	3.22	29.3	5.93	5.70	7.67	11.1
COPPER	5.91	6.61	4.50	17.2	5.75	6.34	20.3	19.4
IRON	9360J	9850J	4760J	19800J	9770J	9190J	14400J	19100J
LEAD	2.73	3.29	3.99	22.5	2.80	2.55	22.8	29.2J
MAGNESIUM	2530J	3140J	1350J	5280J	2660J	2660J	4100J	9130J
MANGANESE	108J	115J	55.4J	584J	109J	98.2J	173J	488J
MERCURY	< 0.050	< 0.054	0.063	0.116	< 0.054	0.064	0.087	0.109
NICKEL	27.4	32.7	10.9	31.3	28.6	28.4	31.8	64.3J
POTASSIUM	931	998	705	1820	926	937	1530	1080
SELENIUM	< 0.221	< 0.229	< 0.242	< 0.216	< 0.224	< 0.235	< 0.213	< 0.216UJ
SILVER	0.532J	< 0.540UJ	< 0.556UJ	3.35J	< 0.499UJ	< 0.503UJ	0.998J	0.839
SODIUM	469J	1090J	718J	461J	329J	745J	1900J	738
THALLIUM	< 0.284UJ	< 0.295UJ	< 0.311UJ	< 0.278UJ	< 0.288UJ	< 0.302UJ	< 0.273UJ	< 0.278
VANADIUM	26.0J	22.6J	13.9J	38.0J	26.6J	23.2J	30.4J	37.4
ZINC	20.6	23.8	11.8	62.9	19.4	19.6	39.8	39.1J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 12-4
NAS ALAMEDA - SITE 12
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	Duplicate B12-10-000	B12-10-002	B12-10-008	B12-10-014
Date Sampled	08/05/91	08/05/91	08/05/91	08/05/91
Depth of Sample	0.0 ft	2.0 ft	8.0 ft	14.0 ft
PARAMETER REPORTED				
METALS (mg/kg-dry)				
ALUMINUM	9220J	3900J	6590J	14500J
ANTIMONY	4.9J	3.1J	4.8J	6.8J
ARSENIC	2.10	1.36	1.93	4.02
BARIUM	77.6J	17.8J	40.4J	27.0J
BERYLLIUM	0.385	0.379	0.673	0.641
CADMIUM	< 0.285	< 0.275	< 0.344	< 0.358
CALCIUM	3640J	1850J	2720J	3370J
CHROMIUM, TOTAL	35.1	30.1	38.3	48.8
COBALT	9.92	4.61	5.95	9.54
COPPER	23.1	4.51	6.63	13.0
IRON	17800J	7440J	10300J	19000J
LEAD	19.4J	2.24J	2.81J	3.73J
MAGNESIUM	7990J	1990J	3090J	6770J
MANGANESE	421J	82.5J	118J	274J
MERCURY	0.108	< 0.101	< 0.120	< 0.124
NICKEL	49.3J	23.4J	33.5J	43.0J
POTASSIUM	853	571	1140	2300
SELENIUM	< 0.216UJ	< 0.206UJ	< 0.262UJ	< 0.261UJ
SILVER	0.557	0.551	0.900	1.09
SODIUM	623	377	658	1460
THALLIUM	< 0.278	< 0.265	< 0.337	< 0.335
VANADIUM	34.6	19.0	27.4	42.4
ZINC	34.6J	16.1J	23.4J	41.8J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 12-5
NAS ALAMEDA - SITE 12
GROUNDWATER ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	M12-01	Duplicate M12-01	M12-02	M12-03	M12-04
Date Sampled	**08/27/91**	**08/27/91**	**08/27/91**	**08/27/91**	**08/27/91**
PARAMETER REPORTED					
VOLATILE ORGANICS (µg/L)					
1,2-DICHLOROETHENE, TOTAL	< 1.0	< 1.0	1.6	< 1.0	< 1.0
ACETONE	< 2.0	< 2.0	3.6	< 2.0	2.9
METHYLENE CHLORIDE	1.4	< 1.0	1.4	< 1.0	1.2
SEMIVOLATILE ORGANICS (µg/L)					
ACENAPHTHENE	< 1.0	< 1.0	3.2J	< 1.0	< 1.0
BIS(2-CHLOROETHYL)ETHER	< 1.5	< 1.5	< 1.5	2.3J	< 1.5
FLUORANTHENE	< 1.0	< 1.0	2.6J	< 1.0	< 1.0
PHENANTHRENE	< 1.0	< 1.0	3.8J	< 1.0	< 1.0
PYRENE	< 1.0	< 1.0	5.9J	2.6J	1.2J
PESTICIDES/PCBS (µg/L)					
ALDRIN	<0.050UJ	<0.050UJ	<0.050UJ	<0.050UJ	<0.050UJ
TOTAL PETRO. HYDROCARBONS (mg/L)	ND	ND	ND	ND	ND

Notes: ND = Not detected
J = Qualified, estimated value
UJ = Qualifed, estimated not detected
< = Analyte reported bleow detection limit
TOTAL = Includes "trans" and "cis" isomers
Shaded areas highlight detections above the detection limit.
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 12-6
NAS ALAMEDA - SITE 12
GROUNDWATER ANALYTICAL RESULTS FOR METALS

Sample Number	M12-01	Duplicate M12-01	M12-02	M12-03	M12-04
Date Sampled	**08/27/91**	**08/27/91**	**08/27/91**	**08/27/91**	**08/27/91**
PARAMETER REPORTED					
METALS (µg/L)					
ALUMINUM	< 31.0	< 31.0	559	< 31.0	170
ANTIMONY	26.3	< 25.1	< 25.1	< 25.1	< 25.1
ARSENIC	4.6	5.3	< 2.6	3.8	< 2.6
BARIUM	523	493	19.4	271	84.0
BERYLLIUM	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
CADMIUM	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
CALCIUM	115000J	110000J	20000J	96600J	18300J
CHROMIUM,TOTAL	< 5.7	< 5.7	6.7	< 5.7	< 5.7
COBALT	< 6.1	< 6.1	< 6.1	< 6.1	< 6.1
COPPER	< 2.1	< 2.1	5.4	< 2.1	< 2.1
IRON	96.3J	9.6UJ	973J	68.2J	201J
LEAD	2.9J	< 2.0UJ	2.2J	< 2.0UJ	< 2.0UJ
MAGNESIUM	222000	198000	12200	63900	15000
MANGANESE	1000	957	102	833	97.7
MERCURY	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
NICKEL	< 13.2	< 13.2	< 13.2	< 13.2	< 13.2
POTASSIUM	86800	80800	25600	30600	23100
SELENIUM	< 10.5UJ	< 2.1UJ	< 2.1UJ	< 2.1UJ	< 2.1UJ
SILVER	< 4.9	< 4.9	< 4.9	< 4.9	< 4.9
SODIUM	2540000J	2450000J	294000J	343000J	324000J
THALLIUM	< 2.7UJ	< 2.7UJ	< 2.7UJ	< 2.7UJ	< 2.7UJ
VANADIUM	25.0	24.7	14.3	10.7	< 4.2
ZINC	< 2.3	< 2.3	7.7UJ	12.6UJ	7.2UJ

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 12-7
NAS ALAMEDA - SITE 12
GROUNDWATER ANALYTICAL RESULTS FOR GENERAL CHEMICALS

Sample Number	M12-01	Duplicate M12-01	M12-02	M12-03	M12-04
Date Sampled	**08/27/91**	**08/27/91**	**08/27/91**	**08/27/91**	**08/27/91**
PARAMETER REPORTED					
PHYSICAL PARAMETERS-LAB					
ALKALINITY, BICA (mg/L-CaC03)	184	NA	110	93.0	85.0
ALKALINITY, CARB (mg/L-CaC03)	< 5.0	NA	< 5.0	< 5.0	< 5.0
ALKALINITY, NC/OH (mg/L-CaCO3)	< 5.0	NA	< 5.0	< 5.0	< 5.0
ALKALINITY, PHENOLPH (mg/L)	< 5.0	NA	< 5.0	< 5.0	< 5.0
ALKALINITY, T. (mg/L-CaCO3)	184J	NA	110J	93.0J	85.0J
TOTAL DISSOLVED SOLIDS (mg/L)	6800J	NA	1040J	1670J	1640J
PHYSICAL PARAMETERS-FIELD					
pH, FIELD (Std. Units)	7.80	7.80	8.10	7.10	7.60
SP. COND., FIELD @25C (µmhos/cm)	14500	14500	1300	3000	2600
WATER TEMP (C)	20.6	20.6	21.2	27.3	20.2
TOTAL ORGANIC CARBON (mg/L)					
CARBON, TOC	19.8J	20.3J	24.8J	11.9J	21.3J
ANIONS (mg/L)					
CHLORIDE	3541J	NA	132.1J	668.3J	697.8J
FLUORIDE	0.54J	NA	0.93J	0.22J	0.55J
NITROG, NO2 + NO3	0.106	NA	0.085	0.028	0.023
SULFATE	62.34J	NA	3.856J	49.14J	49.27J

Notes: NA = Not analyzed
J = Qualified, estimated value
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

13.0 SITE 14
FIRE TRAINING AREA

13.1 SITE DESCRIPTION AND BACKGROUND

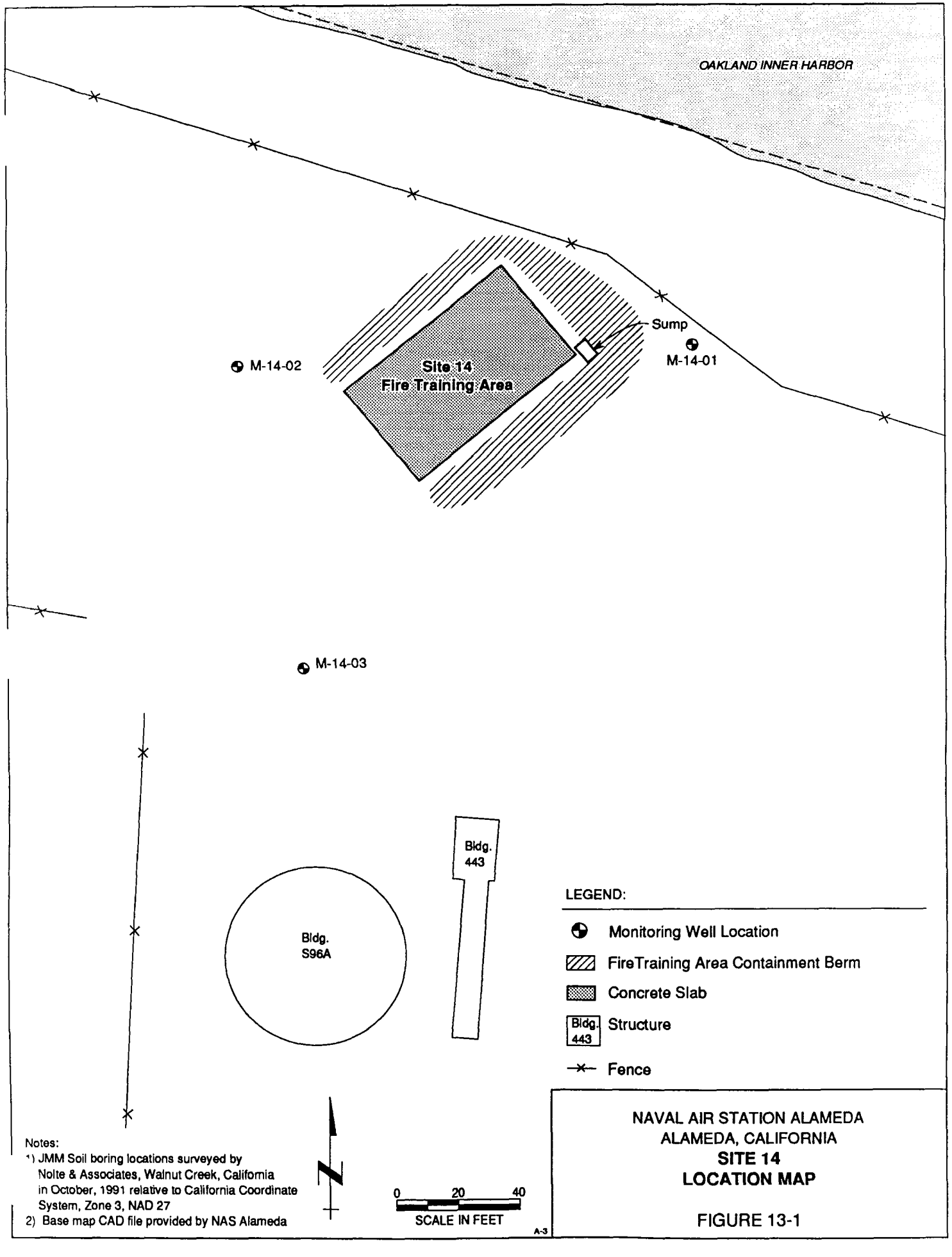
Site 14 (Former Initial Assessment Study Site-12) is the fire training area (FTA), located on Perimeter Road near Building 443 (Figure 13-1). The site consists of a concrete pad surrounded on three sides by an earthen berm. The containment berm was constructed between 1973 and 1979 (Perry, 1991). An above ground steel tank sits in the center of the pad. Waste fuels from NAS Alameda plane defueling operations were burned in the tank (Canonie, 1990a). The site has also been used as a fire extinguisher discharge point and a fire fighting and rescue training area. Ansulite fire-fighting foam was mixed in a nearby tank and used to extinguish training fires. A sump is located in the northeast corner of the pad. From field observations during this investigation, it appears that the sump has been used for the collection of runoff from fire training activities.

13.2 CURRENT USE

The fire department stopped burning at the area in 1986 or 1987 (Perry, 1991). The fire training area is currently used only for rescue training. During rescue training, the fire department cuts open automobiles using "jaws of life" and other rescue equipment. It is not known if all oil, gasoline, and other hydrocarbon fluids are removed from the autos prior to rescue training.

13.3 REMEDIAL INVESTIGATION

This investigation at Site 14 included a soil gas survey, borehole drilling and monitoring well construction, and groundwater sampling. Contaminants of interest in this investigation were fuels and oils, fire fighting foam components (diethylene glycol monobutyl ether and surfactants), and potassium chloride from the discharge of fire extinguishers. The soil gas survey was performed using a grid of 44 sampling points with variable spacing due to the irregular shape of the area. Three soil borings were drilled in the locations shown on Figure 13-1. Groundwater monitoring wells were constructed in all of boreholes. Borehole logs and well construction details are presented in Appendix C. Methods used in the performance of field activities are described in Appendix A. The rationale for borehole locations is presented in Canonie's work plan (Canonie, 1990a).



Notes:
1) JMM Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD file provided by NAS Alameda

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 14
LOCATION MAP

FIGURE 13-1

13.3.1 Site Geology/Hydrogeology

Figure 13-2 is a geologic fence diagram of the site. Relatively fine-grained fill material was present to the total depth investigated (15 feet). Based upon previous work in the vicinity, the depth to native soil, marked by a shell rich clay, is approximately 30 feet (JMM, 1992). The fill consists primarily of silty sands and clays. Locally, the fill contains clean sands, gravel, and asphalt. Trace shell and clay fragments found throughout the fill indicate that it may be dredging spoils or other marine-derived material. Geotechnical sample results are summarized in Table 13-1. Geotechnical results generally corroborate field descriptions of soil at Site 14. The sediments are primarily sands and clayey sands with vertical permeabilities, as determined by the falling head method, ranging from 3.53E-04 to 4.87E-05. The geotechnical laboratory results are in Appendix D.

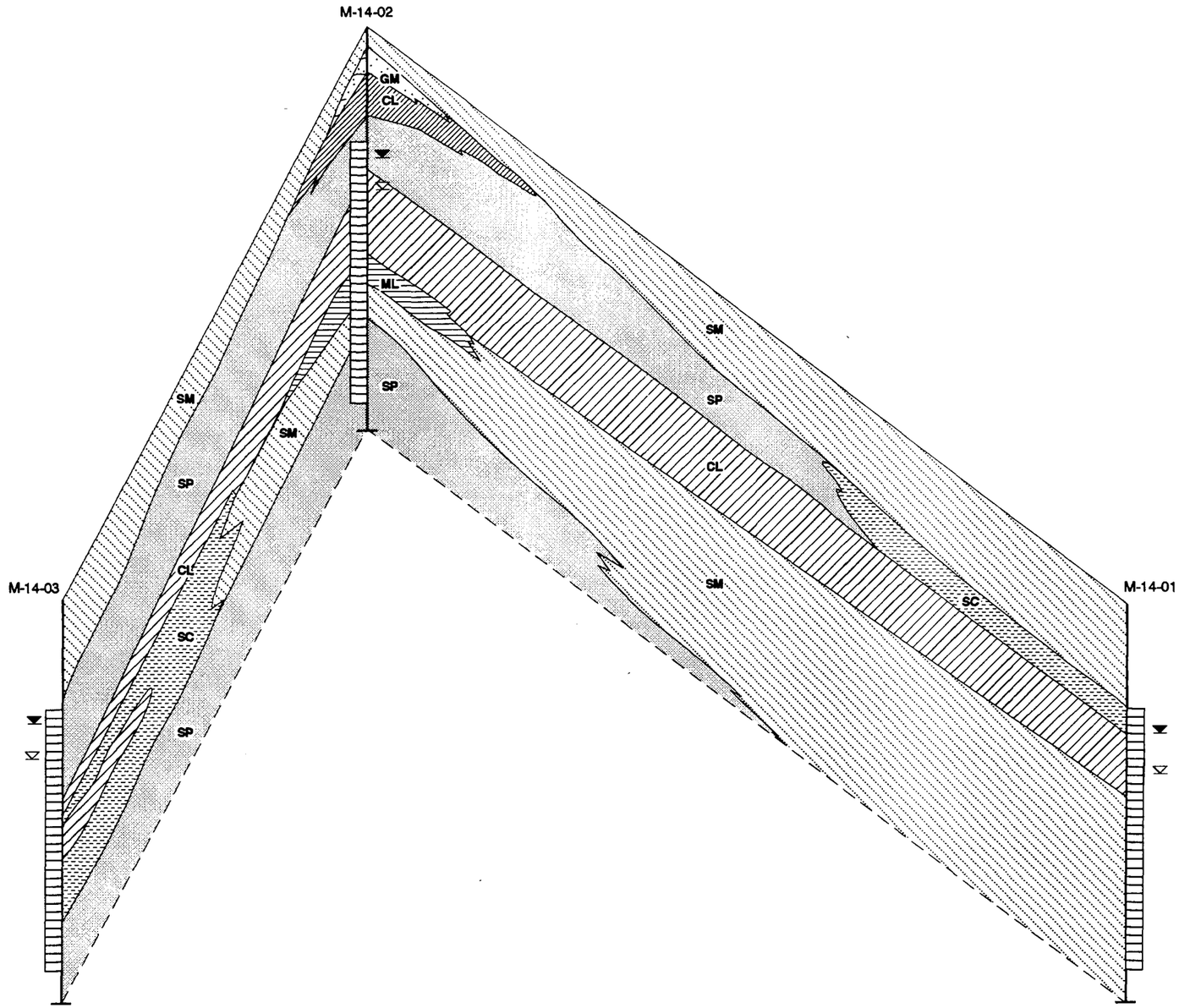
In-situ permeability tests were conducted in the wells at Site 14. The hydraulic conductivities, as determined by the rising-head method of Bouwer and Rice, ranged from 1.3E-03 cm/sec to 1.7E-03 cm/sec (Bouwer and Rice, 1976; Bouwer, 1989). The in-situ permeability test data are presented in Appendix E.

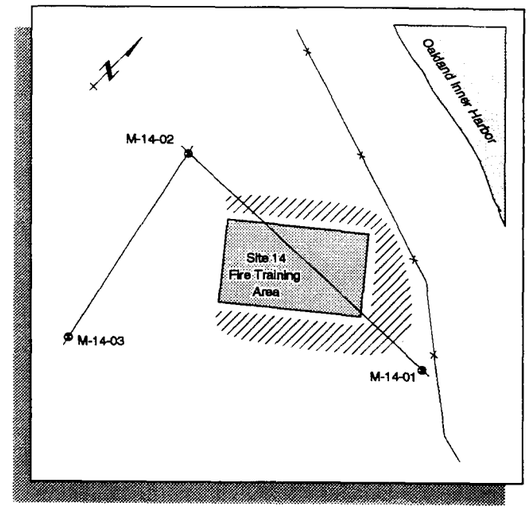
Groundwater in the vicinity of the FTA appears to be influenced by fluctuations in the tides. During one tidal cycle on November 6, 1991, the water level changed by 3 feet in monitoring wells M14-01 and M14-02 and up to 2 feet in monitoring well M14-03. Groundwater elevation data are summarized in Table 13-2. Figures 13-3 and 13-4 present groundwater contour maps for two different times on November 6, 1991. The contour map from elevations collected during high tide (Figure 13-3) shows an estimated direction of groundwater flow almost due south. This direction is almost directly inland from the nearby harbor. The contour map from the data collected at low tide (Figure 13-4) shows an estimated direction of flow toward the southeast. This direction is roughly parallel with the nearby harbor.

A detailed tidal influence study is planned for this site. After the tidal influence study is complete, average groundwater elevations for each well will be calculated and the net groundwater flow direction determined.

13.3.2 Soil Gas Survey Results

Target compounds in the soil gas survey were the chlorinated hydrocarbons tetrachloroethene, trichloroethene, 1,2-dichloroethene (cis and trans isomers), and 1,1-dichloroethene and the aromatic compounds benzene, toluene, ethylbenzene, and xylene (BTEX). The detection limit for all compounds was 0.01 µg/L. No chlorinated hydrocarbons were detected. However, the BTEX were detected in the soil gas samples. The BTEX are common fuel constituents and may be related to past fire training activities. The





LEGEND:

GM Silty Gravel
SP Sand
SM Silty Sand
SC Clayey Sand
ML Silt
CL Clay
First Water During Drilling
Water Level During Water Sampling 8-26-91
Monitoring Well
Screened Interval

Note: No native material encountered at site

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 14
FENCE DIAGRAM

FIGURE 13-2

TABLE 13-1

SITE 14
FIRE TRAINING AREA
GEOTECHNICAL SAMPLE LABORATORY TEST RESULTS

Sample No.	Depth (ft)	Soil Classification Laboratory	Soil Classification Field	Moisture Content (%)	Dry Density (pcf)	Specific Gravity	CEC (meq/100g)	TOC (%w/w)	Permeability Effective Stresses (psi)	Permeability Hydraulic Conductivity (cm/s)
B-14-01	10-10.5	SP	SM	20.0	105.0	NA	14.3	< 0.1	6	8.90E-04
B-14-02	3.5-4	SP	SP	NA	NA	NA	NA	< 0.1	NA	NA
B-14-02	10-10.5	NA	SP	32.0	96.0	2.6	9.8	NA	6	4.87E-05
B-14-03	5.5-6	NA	SP	18.5	101.0	NA	1.6	< 0.1	NA	NA
B-14-03	10-10.5	NA	SC	21.0	100.5	NA	NA	NA	6	3.53E-04

NA - Not Analyzed
Parameters not detectect are reported as less than method detection limit.

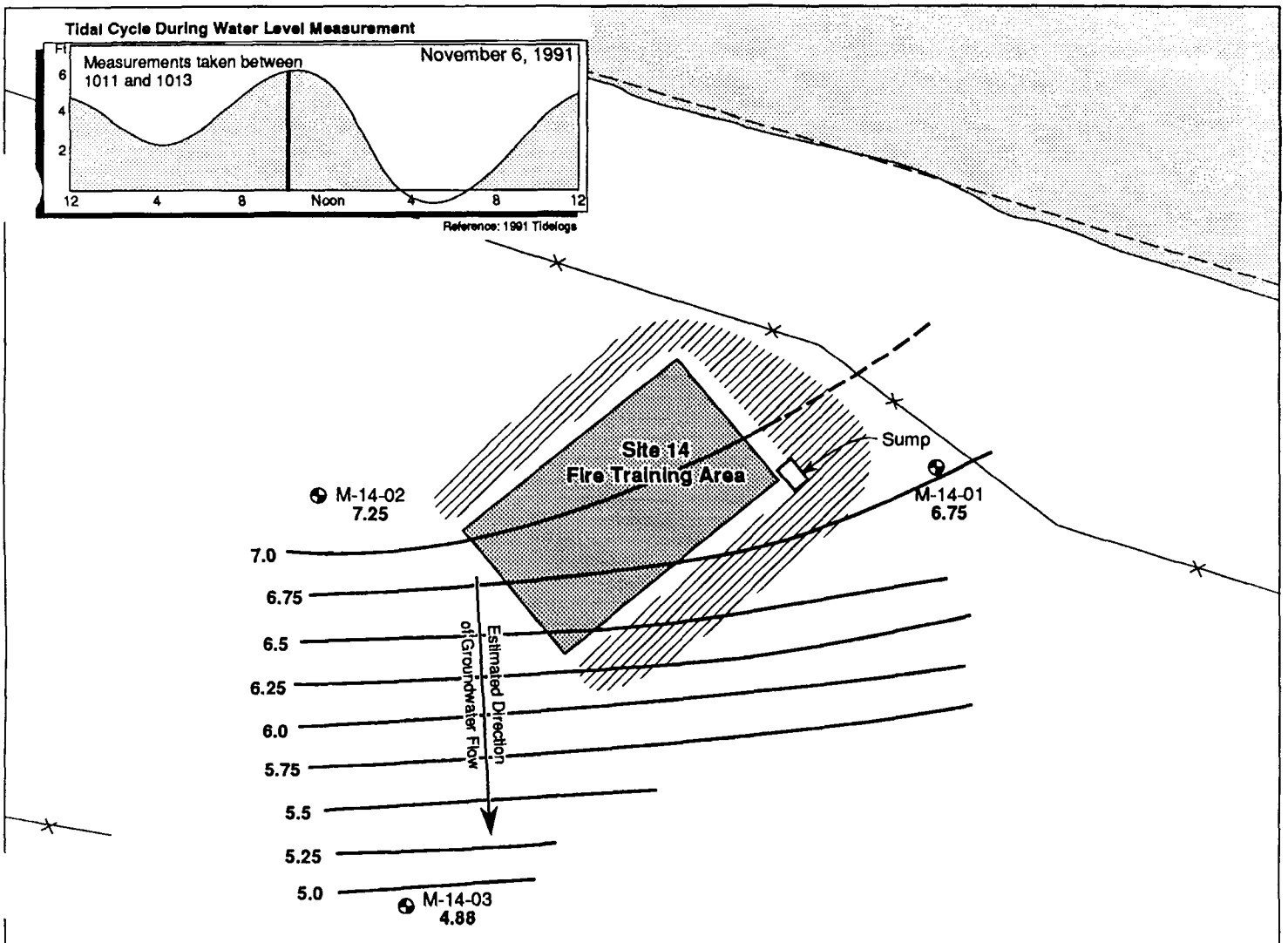
Laboratory Methods (Units):
- Soil Classification - Unified Soil Classification System (USCS) - ASTM D2488
- Moisture Content - ASTM D2216 (percent)
- Dry Density - ASTM D2937 (pounds per cubic foot)
- Specific Gravity - ASTM D854
- Cation Exchange Capacity (CEC) - EPA 9080 (milliequivalents per 100 grams)
- Total Organic Carbon (TOC) - Walkey and Black (percent of wet weight)
- Effective Stress - EPA 9100 (pounds per square inch)
- Hydraulic Conductivity - EPA 9100 (centimeters per second)

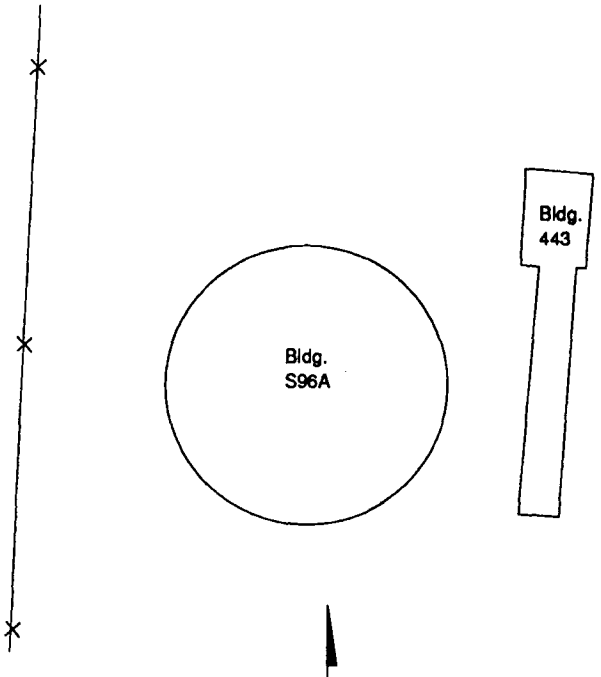
TABLE 13-2

SITE 14
FIRE TRAINING AREA
WATER LEVEL DATA

		Date	Time	Water Level in feet	Water Elevation in feet
M14-01					
ToC	*9.73*	8/26/91	830	6.35	3.38
		9/26/91	1034	4.85	4.88
		11/6/91	1015	2.98	6.75
		11/6/91	1738	6.19	3.54
M14-02					
ToC	*11.15*	8/26/91	827	6.40	4.75
		9/26/91	1123	4.75	6.40
		11/6/91	1013	3.81	7.34
		11/6/91	1743	6.14	5.01
M14-03					
ToC	*10.15*	8/26/91	825	6.01	4.14
		9/26/91	1102	5.80	4.35
		11/6/91	1011	5.27	4.88
		11/6/91	1747	5.93	4.22

ToC - Top of Casing
Elevation datum - USGS Mean Low Low Water





LEGEND:

- 6.75 Monitoring Well Location — Groundwater elevation in feet above mean low low water
- FireTraining Area Containment Berm
- Concrete Slab
- Bldg. 443 Structure
- Fence

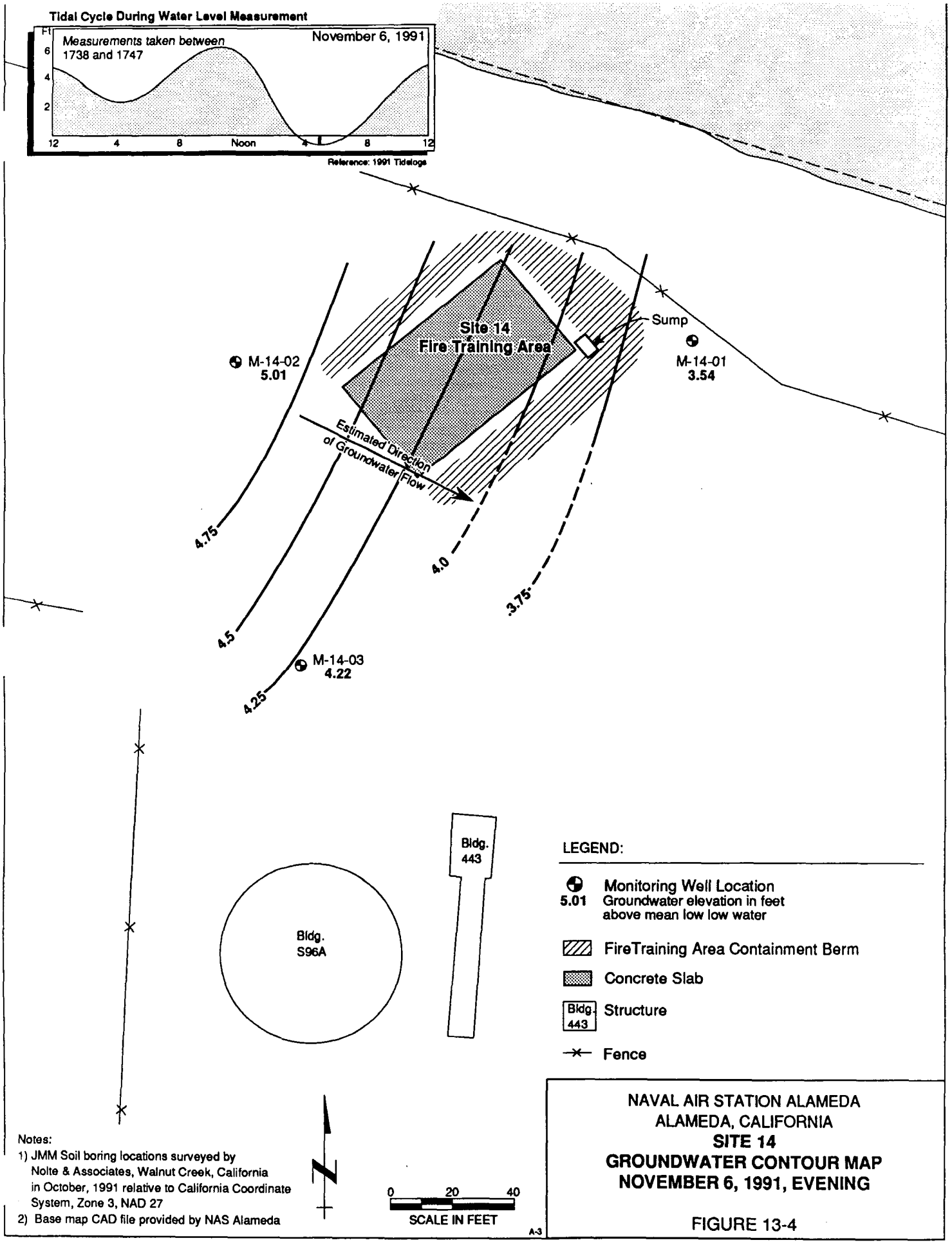
Notes:
1) JMM Soil boring locations surveyed by Volte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD file provided by NAS Alameda

0 20 40
SCALE IN FEET

A-3

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 14
GROUNDWATER CONTOUR MAP
NOVEMBER 6, 1991, MORNING

FIGURE 13-3



Notes:

1) JMM Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD file provided by NAS Alameda

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 14
GROUNDWATER CONTOUR MAP
NOVEMBER 6, 1991, EVENING

FIGURE 13-4

chlorinated hydrocarbons are common solvents that may have been present in waste oils. Figure 13-5 presents an isoconcentration map for benzene. Benzene was chosen because the size and shape of the plume is similar to the other detected compounds and benzene is considered the most hazardous of the aromatic compounds found at the site. Figure 13-5 indicates aromatic compounds were restricted to soil gas from within the bermed area. Isoconcentration maps for the other detected compounds are found in Appendix F. As with benzene, these compounds were found in soil gas only within the bermed area.

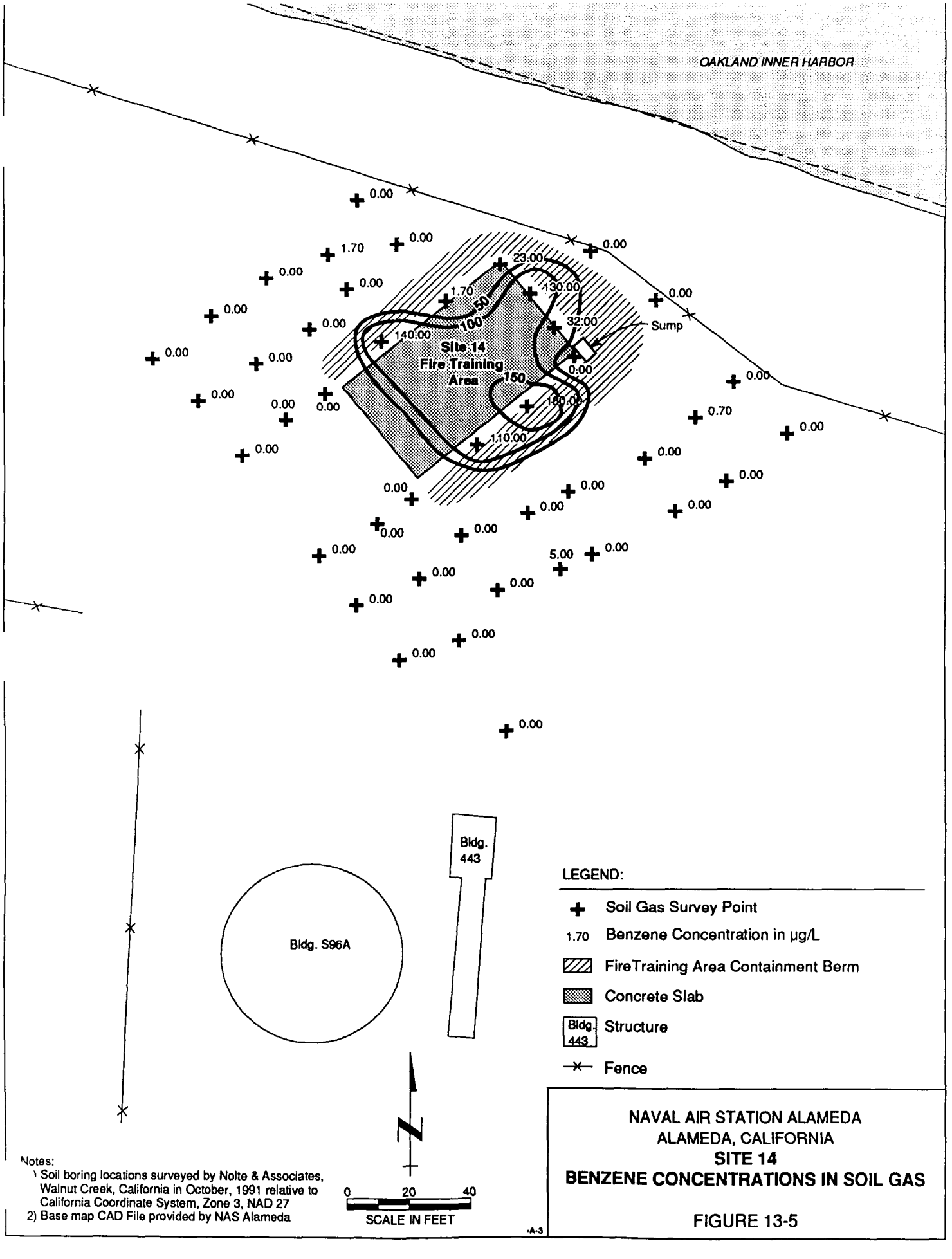
13.3.3 Analytical Results - Soil Samples

Nine subsurface soil samples and three surface soil samples were collected for chemical analysis at Site 14. The surface soil samples were analyzed for TRPH, pesticides/PCBs, SVOCs, dioxin/furan, and metals, The subsurface samples were analyzed for VOCs and EDB, TRPH, pesticides/PCBs, SVOCs, and metals. The rationale for selection of laboratory analyses is presented in Canonie's work plan (Canonie, 1990a). Laboratory methods are described in Section 4.0. Laboratory QC data are summarized in the QCSR submitted under separate cover. Analytical results are found in tables at the end of this section. The concentrations of organic compounds detected in soil samples from Site 14 are presented in Table 13-3. Analytical results for dioxin/furan and metals are presented in Tables 13-14 and 13-5, respectively. Note that Tables 13-3 and 13-4 contain results for only those analytes detected in site soils. A complete list of analytes potentially detected by the laboratory methods is presented in Section 4.0.

Selected soil samples were also analyzed for TOC and pH. These data will be used in the feasibility study portion of the project and are not discussed here. TOC and pH data are found in Appendix B.

13.3.3.1 Volatile Organic Compounds. Analytical results for VOCs are summarized in Table 13-3. Acetone was detected in the seven soil samples at concentrations ranging from 200 to 13 µg/kg. The laboratory also detected acetone in method blanks associated with these samples. Based on data qualification procedures described in Section 3.0, three of the samples are qualified as not detected. The 8-foot sample B14-03 is considered an estimate. The remaining detections, all in samples from boring B14-01, are considered valid detections.

Carbon disulfide was detected in the 5-foot sample from boring B14-01 and the 8-foot samples from borings B14-02 and B14-03 at concentrations of 19, 9, and 16 µg/kg.



Notes:
1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda

A-3

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 14
BENZENE CONCENTRATIONS IN SOIL GAS

FIGURE 13-5

Methyl ethyl ketone was detected in one only sample, B14-03 at 8 feet, at a concentration of 17 µg/kg. Methylene chloride was detected in three samples at concentrations ranging from 5.3 to 11 µg/kg. The highest concentration was detected in the 5-foot sample from boring B14-01.

13.3.3.2 Total Recoverable Petroleum Hydrocarbons. Analytical results for TRPH are summarized in Table 13-3. TRPH were detected in all four samples collected from boring B14-01. The detected concentrations are highest in the surface sample (661 mg/kg) and decrease to 39.3 mg/kg in the 14-foot sample.

TRPH were detected in the surface sample from boring B14-02 at a concentration of 2,070 mg/kg. TRPH were not detected in the 2-foot sample from this boring. Concentrations in 8-foot and 14-foot samples were 45.1 and 34 mg/kg, respectively.

The surface sample from boring B14-03 contained TRPH at a concentration of 1,830 mg/kg. Concentrations decreased to 33.9 mg/kg in the 4-foot sample and 41.4 mg/kg in the 14-foot sample. No TRPH were detected in the 8-foot sample.

13.3.3.3 Pesticides/PCBs. Analytical results for pesticides/PCBs are summarized in Table 13-3. The PCB Aroclor-1260 was detected in only the surface samples from boring B14-01 and B14-02 at concentrations of 210 and 150 µg/kg, respectively.

The pesticides lindane, alpha-chlordane, gamma-chlordane, and 4,4'-DDT were detected in the surface sample of B14-01 at concentrations of 4.23, 11.0, 17.7, and 37.5 µg/kg. Gamma-chlordane was detected in the 2-foot sample from B14-01 at a concentration of 4.28 µg/kg. Alpha and gamma-chlordane were also detected in the surface sample of B14-02 at concentrations of 3.65 and 9.49 µg/kg, respectively. No pesticides were detected in samples collected from boring B14-03.

13.3.3.4 Semivolatile Organic Compounds. Analytical results for SVOCs are summarized in Table 13-3. The polycyclic aromatic hydrocarbons (PAH) chrysene, fluoranthene, phenanthrene, and pyrene were detected in Site 14 soils. The surface sample from B14-01 contained chrysene, fluoranthene, and pyrene at concentrations of 160, 240, and 330 µg/kg, respectively. The sample from 2 feet in B14-01 contained fluoranthene and pyrene at concentrations of 110 and 160, µg/kg. The surface sample from B14-03 contained phenanthrene at a concentration of 110 µg/kg.

Bis(2-ethylhexyl)phthalate was detected in the surface samples from borings B14-01 and B14-02 at concentrations of 520 and 110 µg/kg, respectively.

13.3.3.5 Dioxin/Furan. Analytical results for dioxins and furans in surface samples are summarized in Table 13-4. The surface sample from B14-01 contained the hepta and octa congeners of chlorinated dibenzo-p-dioxin at concentrations of 1.3 and 5.4 nanograms per gram (ng/g), respectively, and the hepta congener of chlorinated dibenzofuran at a concentration of 0.12 ng/g. The hepta and octa congeners of dibenzo-p-dioxin were detected in the surface sample from B14-02 at concentrations of 1.6 and 9.4 ng/g, respectively. No dioxins or furans were detected in boring B14-03.

13.3.3.6 Metals. As discussed in Section 3.0 of this report, background data for metals in soils at NAS Alameda have not been collected. Background data for metals in soil will be collected at a later date. An evaluation of the location and extent of possible metals contamination will be performed after the collection of background soil samples. Data generated in this investigation are presented below. As discussed in Section 3.0, the metals beryllium, chromium, copper, lead, mercury, and nickel have been tentatively identified as metals of concern. Analytical results for these metals are presented below. Results for all metals analyzed are presented in Table 13-5.

Beryllium was detected in all 13 samples collected at the site at concentrations ranging from 0.226 to 1.01 mg/kg. Total chromium was detected in all soil samples collected at concentrations ranging from 11.8 to 85.1 mg/kg. Nickel was detected in all soil samples collected at concentrations ranging from 9.14 to 85 mg/kg. The highest concentrations of these metals was detected in the sample collected from a depth of 5 feet in boring B14-01.

Copper was detected in all 13 samples at concentrations ranging from 2.16 to 64 mg/kg. The highest concentration was detected in the sample collected from a depth of 2 feet in boring B14-01.

Lead was detected in all soil samples collected at concentrations ranging from 1.64 to 108. The highest concentration was detected in the surface sample from boring B14-01.

Mercury was detected in only the surface sample from boring B14-02 at a concentration of 0.125 mg/kg.

13.3.4 Analytical Results - Groundwater Samples

Three groundwater samples and one duplicate sample were collected at Site 14. Groundwater samples were analyzed for VOCs, SVOCs, pesticides/PCBs, TRPH, oil and grease, and metals. Laboratory methods are described in Section 4.0. Laboratory QC data are summarized in the QCSR for this

investigation. All groundwater data tables are presented at the end of this section. The concentrations of organic compounds detected in groundwater samples collected at Site 14 are presented in Table 13-6. Note that this table contains results for only those compounds detected. For a complete list of the analytes potentially detected by these analyses, see Section 4.0. No SVOCs, pesticides/PCBs, or TRPH were identified in Site 14 groundwater samples. Analytical results for metals and general chemicals are summarized in Tables 13-7 and 13-8, respectively.

13.3.4.1 Volatile Organic Compounds. Acetone and 1,2-dichloroethene were detected in well M14-01 at concentrations of 7.0 and 1.8 µg/L, respectively. Although acetone is a common laboratory contaminant, it was not detected in the method blank associated with the samples from well M14-01. Therefore, it must be treated as a valid detection.

13.3.4.2 Oil and Grease. Oil and grease were detected in M14-01 at a concentration of 0.3 mg/L. No oil and grease were identified in other wells at the site.

13.3.4.3 Metals. Analytical results for metals in groundwater are summarized in Table 13-7. In general, the highest levels of metals were detected in sample M14-01. No data are available for background levels of metals in groundwater. Determination of whether levels of metals are elevated will be made at a later date, when background data are available.

13.3.4.4 General Chemicals. Results for general chemical parameters are summarized in Table 13-8. Groundwater conductivities range from 850 to 6,000 at Site 14. This indicates that the water is classified as fresh to brackish (Table 2-1; Freeze and Cherry, 1979). The groundwater pH ranged from 6.70 to 7.6.

TABLE 13-3
NAS ALAMEDA - SITE 14
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B14-01-000	B14-01-002	B14-01-005	B14-01-014	Duplicate B14-01-014	B14-02-000	B14-02-002
Date Sampled	07/11/91	07/11/91	07/11/91	07/11/91	07/11/91	07/10/91	07/10/91
Depth of Sample	0.0 ft	2.0 ft	5.0 ft	14.0 ft	14.0 ft	0.0 ft	2.0 ft
PARAMETER REPORTED							
VOLATILE ORGANICS (µg/kg-dry)							
ACETONE	NA	< 11	160	13	14	NA	< 13
CARBON DISULFIDE	NA	< 5.4	19	< 6.1	< 6.1	NA	< 6.3
METHYL ETHYL KETONE	NA	< 11	< 19	< 12	< 12	NA	< 13
METHYLENE CHLORIDE	NA	< 5.4	11	< 6.1	< 6.1	NA	< 6.3
SEMIVOLATILE ORGANICS (µg/kg-dry)							
BIS(2-ETHYLHEXYL)PHTHALATE	520J	< 110	< 190	< 120	< 120	110J	< 130UJ
CHRYSENE	160J	< 110	< 190	< 120	< 120	< 100UJ	< 130UJ
FLUORANTHENE	240J	110J	< 150	< 97	< 98	< 71UJ	< 88UJ
PHENANTHRENE	< 82	< 86	< 150	< 97	< 98	< 71UJ	< 88UJ
PYRENE	330J	160J	< 150	< 97	< 98	< 71UJ	< 88UJ
PESTICIDES/PCBS (µg/kg-dry)							
4,4'-DDT	37.5J	< 7.15	< 12.6	< 8.09	< 8.18	< 6.79	< 8.39
Aroclor-1260	210J	< 36	< 63	< 40	< 41	150J	< 42
alpha-Chlordane	11.0J	< 3.57	< 6.31	< 4.05	< 4.09	3.65J	< 4.19
gamma-BHC (Lindane)	4.23J	< 1.79	< 3.16	< 2.02	< 2.04	< 1.70	< 2.10
gamma-Chlordane	17.7J	4.28	< 6.31	< 4.05	< 4.09	9.49J	< 4.19
TOTAL PETRO. HYDROCARBONS (mg/kg-dry)							
HYDROCARBONS,PETROL	661	534	60.2	39.3	39.0	2070	< 35.5

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected
J = Qualified, estimated value
< = Analyte reported bleow detection limit
Shaded areas highlight detections above the detection limit.
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 13-3
NAS ALAMEDA - SITE 14
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B14-02-008	B14-02-014	B14-03-000	B14-03-004	B14-03-008	B14-03-014
Date Sampled	07/10/91	07/10/91	07/10/91	07/10/91	07/10/91	07/10/91
Depth of Sample	8.0 ft	14.0 ft	0.0 ft	3.5 ft	8.0 ft	14.0 ft
PARAMETER REPORTED						
VOLATILE ORGANICS (µg/kg-dry)						
ACETONE	21UJ	13UJ	NA	< 11	200J	15UJ
CARBON DISULFIDE	9	< 6.0	NA	< 5.3	16	< 6.5
METHYL ETHYL KETONE	< 14	< 12	NA	< 11	17	< 13
METHYLENE CHLORIDE	< 7.1	< 6.0	NA	5.3	6.7	< 6.5
SEMIVOLATILE ORGANICS (µg/kg-dry)						
BIS(2-ETHYLHEXYL)PHTHALATE	< 140UJ	< 120UJ	< 110UJ	< 110UJ	< 130UJ	< 130UJ
CHRYSENE	< 140UJ	< 120UJ	< 110UJ	< 110UJ	< 130UJ	< 130UJ
FLUORANTHENE	< 99UJ	< 85UJ	< 75UJ	< 75UJ	< 90UJ	< 91UJ
PHENANTHRENE	< 99UJ	< 85UJ	110J	< 75UJ	< 90UJ	< 91UJ
PYRENE	< 99UJ	< 85UJ	< 75UJ	< 75UJ	< 90UJ	< 91UJ
PESTICIDES/PCBS (µg/kg-dry)						
4,4'-DDT	< 9.47	< 8.05	< 7.10	< 7.11	< 8.55	< 8.69
Aroclor-1260	< 47	< 40	< 35	< 36	< 43	< 43
alpha-Chlordane	< 4.73	< 4.03	< 3.55	< 3.55	< 4.27	< 4.35
gamma-BHC (Lindane)	< 2.37	< 2.01	< 1.77	< 1.78	< 2.14	< 2.17
gamma-Chlordane	< 4.73	< 4.05	< 3.55	< 3.55	< 4.27	< 4.35
TOTAL PETRO. HYDROCARBONS (mg/kg-dry)						
HYDROCARBONS,PETROL	45.1	34	1830	33.9	< 36.2	41.4

Notes: NA = Not analyzed
UJ = Qualifed, estimated not detected
J = Qualified, estimated value
< = Analyte reported bleow detection limit
Shaded areas highlight detections above the detection limit.
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 13-4
NAS ALAMEDA - SITE 14
SOIL ANALYTICAL RESULTS FOR DIOXIN/FURAN

Sample Number	**B14-01-000**	**B14-02-000**	**B14-03-000**
Date Sampled	**07/11/91**	**07/10/91**	**07/10/91**
Depth of Sample	**0.0 ft**	**0.0 ft**	**0.0 ft**
PARAMETER REPORTED			
Furans (ng/g - dry)			
Heptachlorodibenzofuran	0.12	< 0.17	< 0.028
Dioxins (ng/g -dry)			
Heptachlorodibenzo-p-dioxin	1.3	1.6	< 0.029
Octachlorodibenzo-p-dioxin	5.4	9.4	< 0.14

Notes: < = Analyte reported bleow detection limit
ng/g = nanograms per gram (parts per billion)
Shaded areas highlight detections above the detection limit.

TABLE 13-5
NAS ALAMEDA - SITE 14
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B14-01-000	B14-01-002	B14-01-005	B14-01-014	Duplicate B14-01-014	B14-02-000	B14-02-002	B14-02-008
Date Sampled	07/11/91	07/11/91	07/11/91	07/11/91	07/11/91	07/10/91	07/10/91	07/10/91
Depth of Sample	0.0 ft	2.0 ft	5.0 ft	14.0 ft	14.0 ft	0.0 ft	2.0 ft	8.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	5580	13100	25500	2250	3170	4540	8760	9470
ANTIMONY	3.4	4.9	14	< 2.8	< 2.9	3.6	5.7	7.5
ARSENIC	3.98	9.39	9.07	1.94	2.22	4.88	2.87	5.06
BARIUM	53.8J	81.5J	69.3J	5.61J	7.06J	57.8J	90.4J	68.3J
BERYLLIUM	0.226	0.494	1.01	0.374	< 0.151	0.425	0.670	0.891
CADMIUM	2.99	0.813	< 0.550	< 0.340	< 0.348	2.42	< 0.353	< 0.408
CALCIUM	9670J	3230J	9960J	1860J	7170J	5180J	3670J	2360J
CHROMIUM, TOTAL	43.0	41.7	85.1	14.5	16.5	43.7	22.3	46.9
COBALT	5.70	13.8	17.6	4.24	4.81	5.42	7.41	11.0
COPPER	30.7	64.0	38.8	2.16	3.96	18.2	11.1	18.3
IRON	12800J	22200J	38500J	4810J	6070J	10700J	11700J	19400J
LEAD	108	48.4	10.3	2.14	2.53	85.6	4.66J	6.45J
MAGNESIUM	2780J	6640J	13100J	1290J	1690J	2630J	4550J	5260J
MANGANESE	223J	352J	373J	45.3J	68.0J	160J	380J	296J
MERCURY	< 0.100	< 0.106	< 0.189	< 0.119	< 0.111	0.125	< 0.062	< 0.071
NICKEL	29.7	35.6	85.0	11.0	13.2	27.2	31.3	43.0
POTASSIUM	1040	1370	4210	547	692	715	743	1940
SELENIUM	< 0.203	< 0.208	< 0.396	< 0.224	< 0.249	< 0.202	< 0.260	< 0.281
SILVER	1.03	< 0.522	< 0.898	< 0.555	< 0.569	< 0.495	< 0.576	< 0.667
SODIUM	135J	362J	1420J	185J	255J	214J	813J	1650J
THALLIUM	< 0.261	< 0.267	< 0.509	< 0.288	< 0.321	< 0.260	< 0.334	< 0.361
VANADIUM	23.7	46.6	83.9	10.1	14.1	18.9	22.4	45.8
ZINC	149J	113J	83.1J	10.7J	13.2J	96.6J	31.6J	36.4J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 13-5
NAS ALAMEDA - SITE 14
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B14-02-014	B14-03-000	B14-03-004	B14-03-008	B14-03-014
Date Sampled	07/10/91	07/10/91	07/10/91	07/10/91	07/10/91
Depth of Sample	14.0 ft	0.0 ft	3.5 ft	8.0 ft	14.0 ft
PARAMETER REPORTED					
METALS (mg/kg-dry)					
ALUMINUM	2240	9870	3370	8030	1980
ANTIMONY	< 3.0	7.2	3.2	5.4	< 3.1
ARSENIC	2.56	5.04	2.03	4.86	2.50
BARIUM	7.42J	120J	28.0J	70.9J	7.18J
BERYLLIUM	0.276	0.692	0.426	0.597	0.246
CADMIUM	< 0.357	< 0.314	< 0.303	< 0.359	< 0.375
CALCIUM	3170J	8110J	4980J	3400J	38800J
CHROMIUM, TOTAL	14.0	42.3	16.1	33.9	11.8
COBALT	4.25	12.1	3.80	8.52	3.85
COPPER	2.64	37.9	6.26	13.7	2.46
IRON	4960J	18200J	7030J	14800J	4100J
LEAD	1.64J	58.3	4.68J	9.12J	2.45J
MAGNESIUM	1280J	9120J	2150J	4180J	1280J
MANGANESE	59.1J	346J	88.3J	176J	98.9J
MERCURY	< 0.053	< 0.052	< 0.049	< 0.063	< 0.057
NICKEL	10.7	64.7	15.6	35.0	9.14
POTASSIUM	552	1020	616	1460	512
SELENIUM	< 0.245	< 0.220	< 0.215	< 0.262	< 0.252
SILVER	< 0.584	0.611	< 0.495	< 0.586	< 0.613
SODIUM	347J	185J	141J	432J	399J
THALLIUM	< 0.315	< 0.282	< 0.276UJ	< 0.337UJ	< 0.325UJ
VANADIUM	10.7	28.5	14.2	31.4	8.97
ZINC	10.6J	57.0J	13.7J	29.1J	8.97J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 13-6
NAS ALAMEDA - SITE 14
GROUNDWATER ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number Date Sampled	M14-01 08/26/91	M14-02 08/26/91	M14-03 08/26/91	Resample M14-03 10/14/91
PARAMETER REPORTED				
VOLATILE ORGANICS (µg/L)				
1,2-DICHLOROETHENE, TOTAL	1.8	< 1.0	< 1.0	NA
ACETONE	7.0	< 2.0	< 2.0	NA
SEMIVOLATILE ORGANICS (µg/L)	ND	ND	NA	ND
PESTICIDES/PCBS (µg/L)	ND	ND	NA	ND
TOTAL PETRO. HYDROCARBONS (mg/L)	ND	ND	NA	ND
OIL AND GREASE (mg/L)				
OIL&GR,IR	0.3	< 0.2	< 0.2	NA

Notes: NA = Not analyzed, ND = Not detected
< = Analyte reported bleow detection limit
TOTAL = Includes "trans" and "cis" isomers
Shaded areas highlight detections above the detection limit.

TABLE 13-7
NAS ALAMEDA - SITE 14
GROUNDWATER ANALYTICAL RESULTS FOR METALS

Sample Number	M14-01	M14-02	M14-03
Date Sampled	08/26/91	08/26/91	08/26/91
PARAMETER REPORTED			
METALS (µg/L)			
ALUMINUM	49.3	135	< 31.0
ANTIMONY	< 25.1	< 25.1	< 25.1
ARSENIC	< 2.6	3.9	11.6
BARIUM	126	16.9	133
BERYLLIUM	< 1.3	< 1.3	< 1.3
CADMIUM	< 3.0	< 3.0	< 3.0
CALCIUM	255000J	39800J	116000J
CHROMIUM,TOTAL	< 5.7	5.9	< 5.7
COBALT	< 6.1	< 6.1	< 6.1
COPPER	2.5	< 2.1	< 2.1
IRON	255	176	5010
LEAD	< 2.0	< 2.0	< 2.0
MAGNESIUM	149000J	26600J	18800J
MANGANESE	3470	229	913
MERCURY	< 0.2	< 0.2	< 0.2
NICKEL	< 13.2	< 13.2	< 13.2
POTASSIUM	49400	23900	11900
SELENIUM	< 2.1UJ	< 2.1UJ	< 2.1UJ
SILVER	< 4.9UJ	< 4.9UJ	< 4.9UJ
SODIUM	964000J	225000J	31300J
THALLIUM	< 2.7UJ	< 2.7UJ	< 2.7
VANADIUM	11.7	6.9	< 4.2
ZINC	4.6UJ	< 2.3	20.3UJ

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 13-8
NAS ALAMEDA - SITE 14
GROUNDWATER ANALYTICAL RESULTS FOR GENERAL CHEMICALS

Sample Number	M14-01	M14-02	M14-03
Date Sampled	08/26/91	08/26/91	08/26/91
PARAMETER REPORTED			
PHYSICAL PARAMETERS-LAB			
ALKALINITY, BICA (mg/L-CaC03)	85.0	114	73.0
ALKALINITY, CARB (mg/L-CaC03)	< 5.0	< 5.0	< 5.0
ALKALINITY, NC/OH (mg/L-CaCO3)	< 5.0	< 5.0	< 5.0
ALKALINITY, PHENOLPH (mg/L)	< 5.0	< 5.0	< 5.0
ALKALINITY, T. (mg/L-CaCO3)	85.0J	114J	73.0J
PHYSICAL PARAMETERS-FIELD			
pH, FIELD (Std. Units)	7.00	7.60	6.70
SP. COND., FIELD @25C (µmhos/cm)	6000	1200	850
TOTAL ORGANIC CARBON (mg/L)			
CARBON, TOC	39.4J	30.7J	12.8J
ANIONS (mg/L)			
CHLORIDE	2146J	100.1J	17.43J
FLUORIDE	0.25J	0.48J	0.28J
NITROG, NO2 + NO3	0.071	0.098	0.098
SULFATE	327.6J	40.93J	110.0J

Notes: J = Qualified, estimated value
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.

14.0 SITE 15
BUILDINGS 301 AND 389
TRANSFORMER STORAGE AREA

14.1 SITE DESCRIPTION AND BACKGROUND

Site 15 consists of Buildings 301 and 389. The IAS site reference number previously used for this site was IAS-5. The site is located north of Runway 7-25 and Perimeter Road, approximately 500 feet south of the Oakland Inner Harbor (Figure 14-1). During the early 1900s, a railroad spur was constructed over and through this site for loading and off-loading ships.

The Navy constructed buildings at the site in the 1950s. Former Building 301 was used for storage of electrical equipment, oil-filled transformers, and old, unused machinery. Before Building 389 was torn down (the concrete slab is still in place), it was also used for storage of transformers (Canonie, 1990a). During a site visit, Canonie personnel reported that several 55-gallon drums of hydraulic fluid were stored in Building 301 and surface soils around Building 301 were discolored. Building 283, which is north of Building 301 (Figure 14-1), is not part of this study.

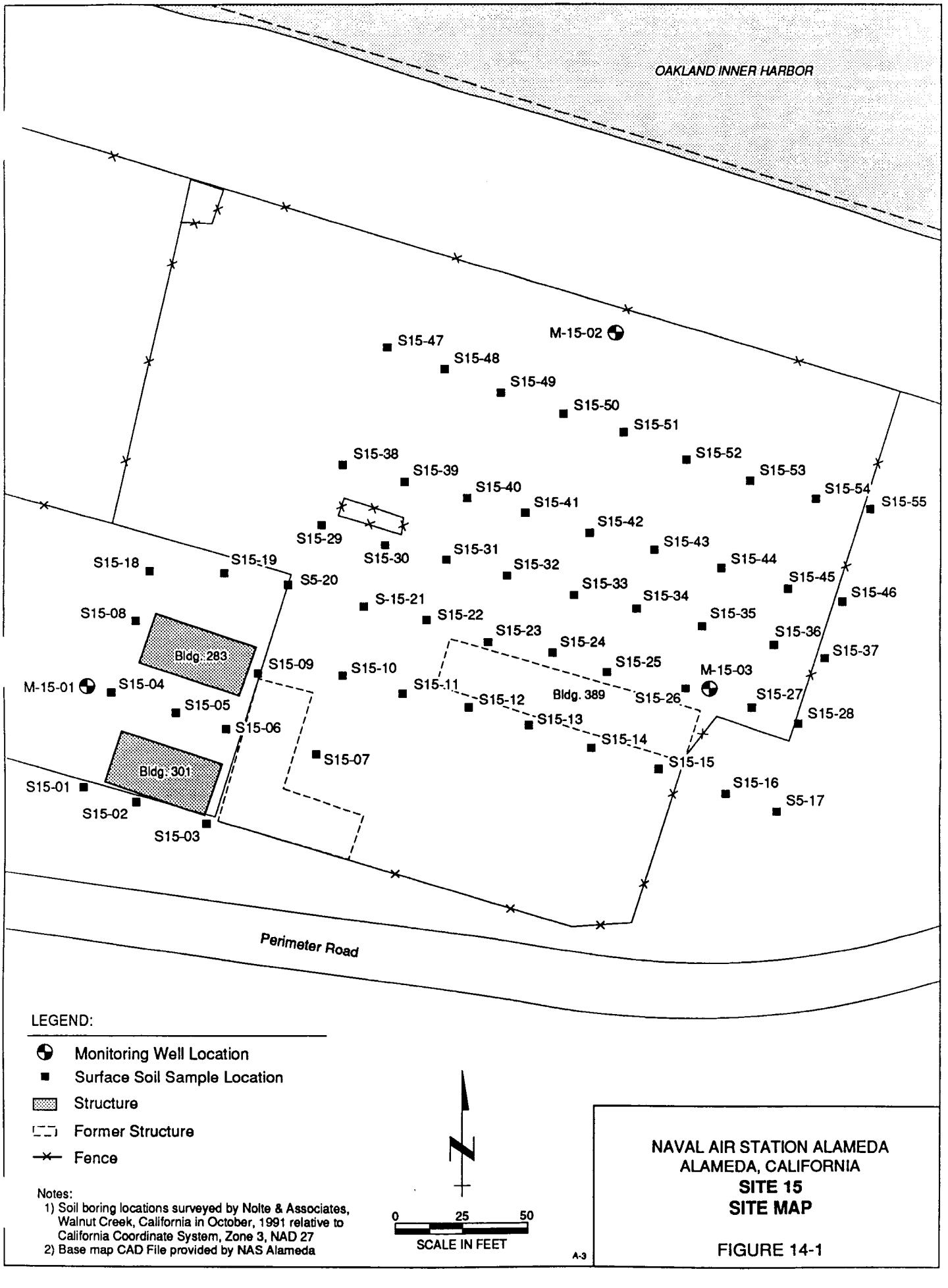
An estimated 200 to 400 gallons of PCB oil contained in transformers was stored in Building 389. Occasionally, there was spillage of the PCB oil. The PCB oil was drained on a regular basis and used to spray on the grounds around the nearby buildings for weed control (Canonie, 1990a).

14.2 CURRENT USE

The fire department now uses the area around Buildings 301 for storage of equipment and hazardous materials. The area around the building is fenced. The area around the foundation of Building 389 is used as a storage yard for one of the base maintenance groups. This area is also enclosed by a fence.

14.3 PREVIOUS INVESTIGATION

Sampling of surface soil was performed by Wahler Associates during the verification step of the NACIP program (Wahler Associates, 1985). Twelve surface soil samples were collected from north of the Building 389 concrete foundation. The samples were analyzed for PCBs only. The highest PCB concentration detected was 3 mg/kg (Canonie, 1990a; Wahler Associates, 1985).


OAKLAND INNER HARBOR
M-15-02
S15-47
S15-48
S15-49
S15-50
S15-51
S15-52
S15-53
S15-54
S15-55
S15-38
S15-39
S15-40
S15-41
S15-42
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S15-34
S15-35
S15-36
S15-37
S15-18
S15-19
S5-20
S-15-21
S15-22
S15-23
S15-24
S15-25
S15-26
S15-27
S15-28
S15-08
Bldg. 283
S15-09
S15-10
S15-11
S15-12
S15-13
S15-14
S15-15
S15-16
S5-17
M-15-01
S15-04
M-15-03
Bldg. 389
S15-05
S15-06
S15-07
Bldg. 301
S15-01
S15-02
S15-03
Perimeter Road
LEGEND:
Monitoring Well Location
Surface Soil Sample Location
Structure
Former Structure
Fence
Notes:
1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda
0
25
50
SCALE IN FEET
A-3
NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 15
SITE MAP
FIGURE 14-1

14.4 REMEDIAL INVESTIGATION

The field investigation at Site 15 included surface geophysics, collecting surface soil samples, drilling of soil borings, soil sampling, installation and sampling of monitoring wells, in-situ permeability testing, and water level measuring. Field methods are described in Appendix A. The borings were drilled near Building 301 and on the east and north sides of the site with a hollow stem auger rig (Figure 14-1). The three soil borings were converted to monitoring wells. Boring logs and well construction details are presented in Appendix C.

14.4.1 Site Geology/Hydrogeology

Material underlying Site 15 can be divided into two groups: fill material and native sediments. Lithologic logs for the borings are presented in Appendix C. Fill material underlies the site from ground surface to approximately 12 to 13 feet below ground surface. The fill material consists of interbedded fine-grained, well-sorted sands (SP), moderately well-sorted silty to clayey sands (SC), and clays (CL) (Table 14-1). The native sediments consist of sandy-silty clay (SC) and clayey sand to clay (CL). The native sediments are believed to be Holocene Bay Mud. Geotechnical analytical data are listed in Table 14-1, and the laboratory data sheets are presented in Appendix D. A fence diagram of the materials encountered during drilling is shown on Figure 14-2.

In-situ permeability tests were conducted in the wells at Site 15. The hydraulic conductivities, as determined by the Bouwer and Rice rising-head method, ranged from 3.4E-02 cm/sec to 2.9E-04 cm/sec (Bouwer and Rice, 1976; Bouwer, 1989). In-situ permeability test data are included in Appendix E.

The average depth to groundwater was 3.7 feet below ground surface and ranged from 2.5 to 5.2 feet below ground surface. Groundwater elevations were collected from September to November, 1991, and are listed in Table 14-2. Water level data were collected during different lunar phases and at different times within the diurnal tidal cycle to determine whether tidal fluctuations were affecting groundwater elevations. As shown in Table 14-2, groundwater elevations varied 2.47 feet in well M-15-02 on November 6, 1991. Therefore, it appears that tidal influences are present at the site. Groundwater flow was measured to the east northeast at a gradient of approximately 0.0035 ft/ft on September 4, 1991, and to the southeast at a gradient of approximately 0.0054 ft/ft on November 6, 1991 (Figures 14-3, and 14-4). A tidal influence study will be performed at this site to further characterize groundwater flow directions and gradients.

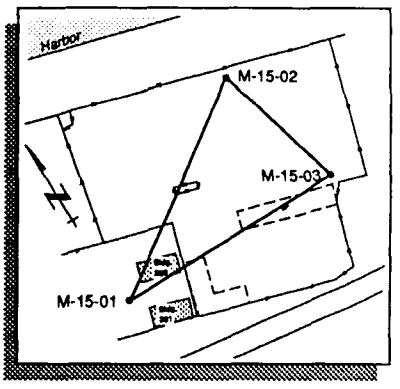
TABLE 14-1

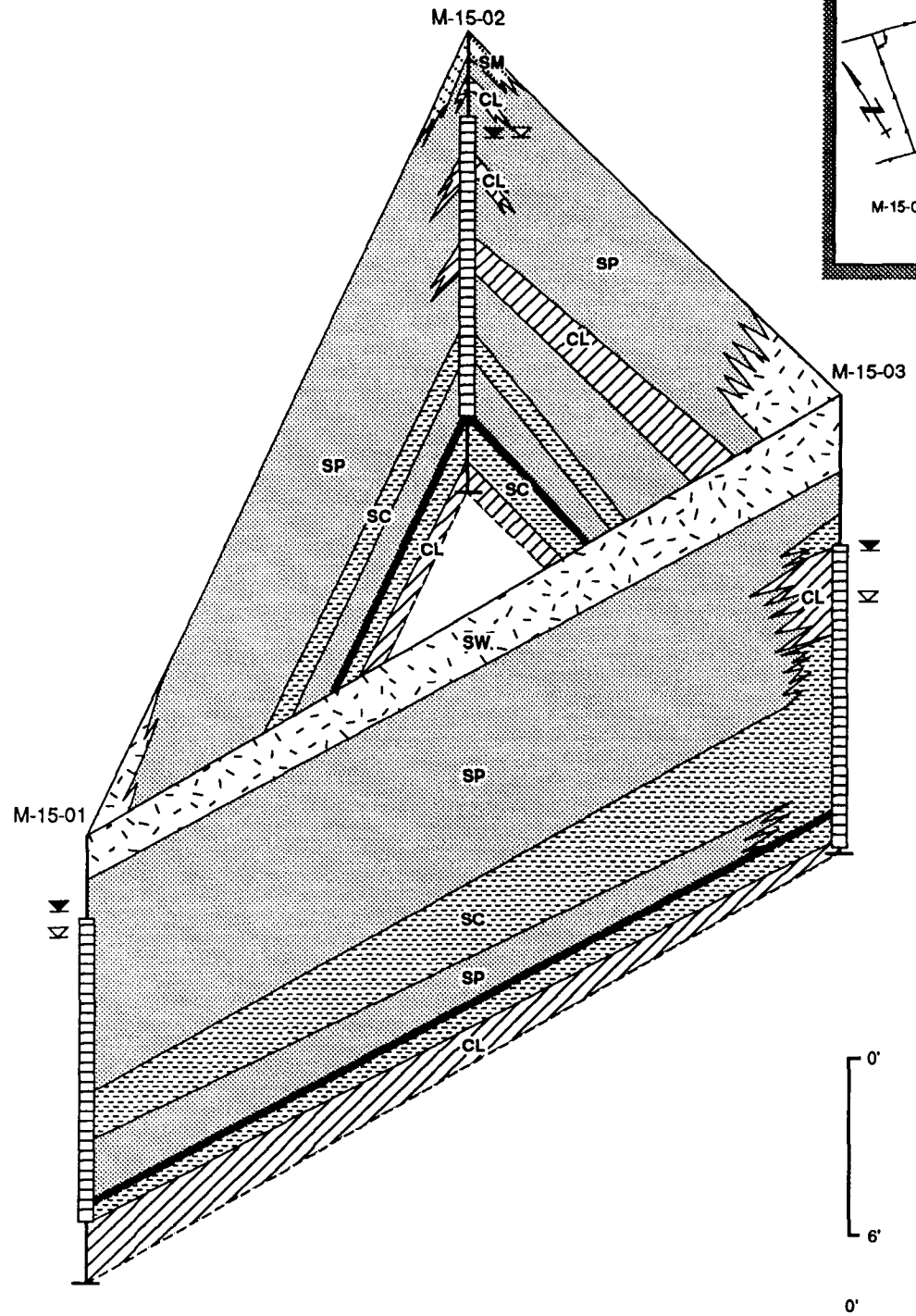
SITE 15
BUILDINGS 301 AND 389
TRANSFORMER STORAGE AREA
GEOTECHNICAL SAMPLE LABORATORY TEST RESULTS

Sample No.	Depth (ft)	Soil Classification Laboratory	Soil Classification Field	Moisture Content (%)	Dry Density (pcf)	Specific Gravity	CEC (meq/100g)	TOC (%w/w)	Permeability Effective Stresses (psi)	Permeability Hydraulic Conductivity (cm/s)
B-15-01	4-4.5	NA	SP	19.5	104.5	NA	3.8	NA	NA	NA
B-15-01	10-10.5	SP	SP	NA	NA	NA	NA	NA	NA	NA
B-15-01	13-13.5	NA	CL	28.5	95	NA	NA	0.4	3	8.07E-07
B-15-02	4-4.5	NA	CL	31	68.5	NA	16.6	0.9	3	7.14E-08
B-15-02	10-10.5	SC	SC	NA	NA	NA	NA	NA	NA	NA
B-15-02	13.5-14	NA	SC	NA	NA	NA	NA	NA	NA	NA
B-15-03	10.5-11	NA	SC	18	113	2.71	37.3	ND	7	1.14E-05

NA - Not Analyzed
Parameters not detectect are reported as less than method detection limit.

Laboratory Methods (Units):
Soil Classification - Unified Soil Classification System (USCS) - ASTM D2488
Moisture Content - ASTM D2216 (percent)
Dry Density - ASTM D2937 (pounds per cubic foot)
Specific Gravity - ASTM D854
Cation Exchange Capacity (CEC) - EPA 9080 (milliequivalents per 100 grams)
Total Organic Carbon (TOC) - Walkey and Black (percent of wet weight)
Effective Stress - EPA 9100 (pounds per square inch)
Hydraulic Conductivity - EPA 9100 (centimeters per second)





0'
6'

0' 50'
SCALE IN FEET

LEGEND:

- SW Gravelly Sand
- SP Sand
- SC Clayey Sand
- SM Silty Sand
- CL Clay
- Approximate Fill/Native Sediment Interface
- First Water During Drilling
- Water Level During Water Sampling
- Monitoring Well
- Screened Interval

A-4

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 15
FENCE DIAGRAM

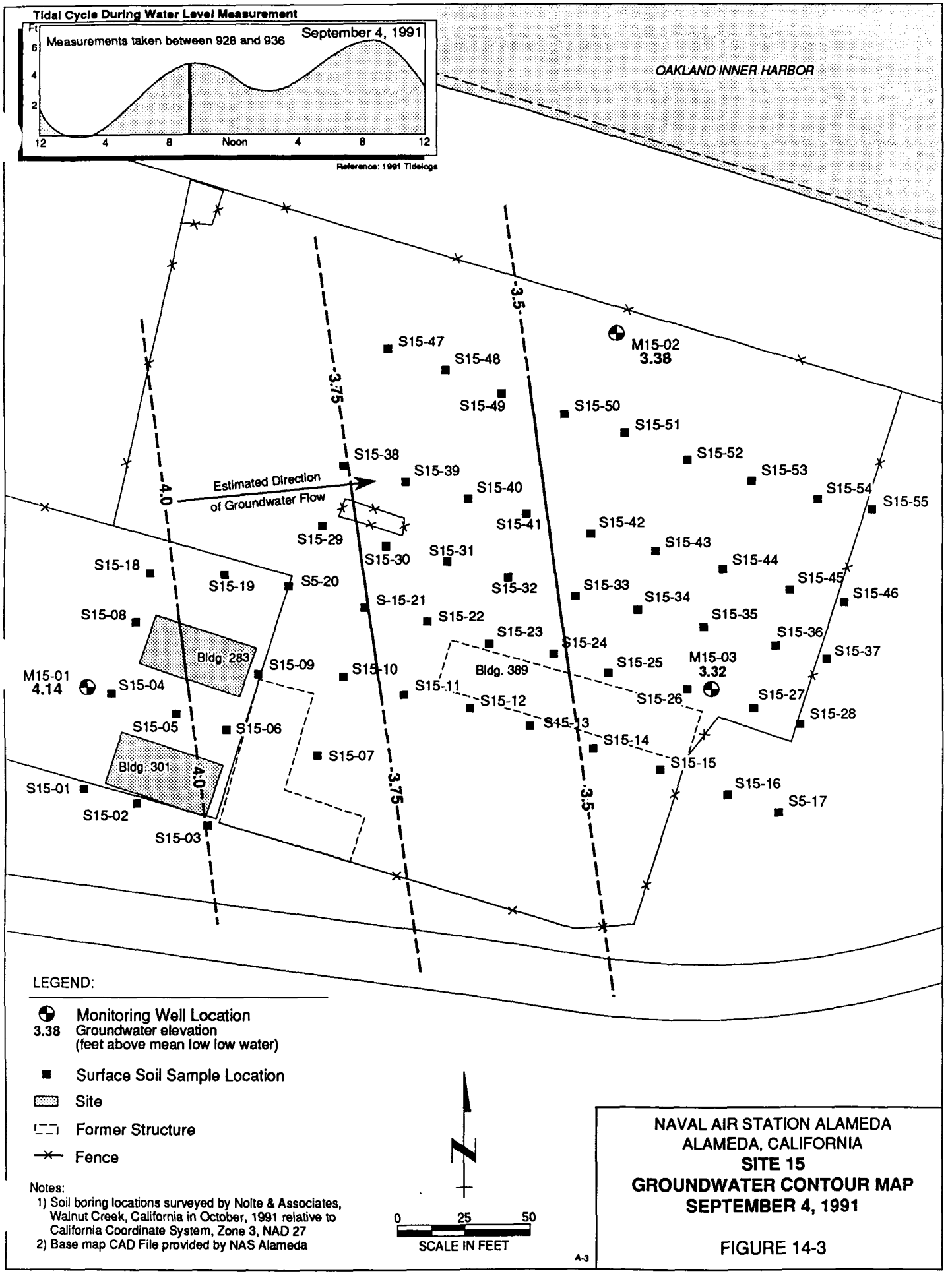
FIGURE 14-2

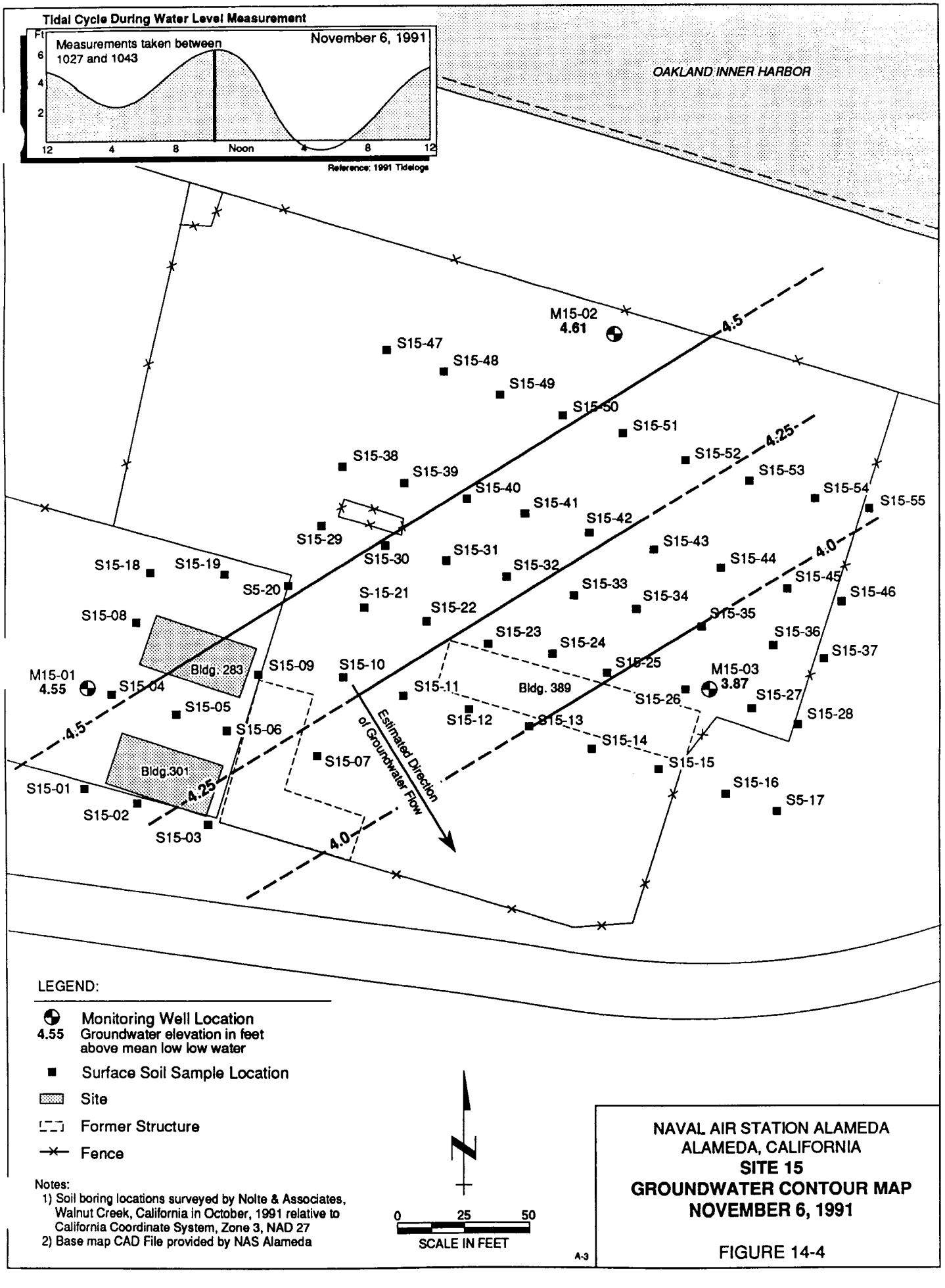
TABLE 14-2

SITE 15
BUILDINGS 301 AND 389
TRANSFORMER STORAGE AREA
WATER LEVEL DATA

		Date	Time	Water Level in feet	Water Elevation in feet
M15-01					
ToC	*6.70*	9/4/91	936	2.56	4.14
		11/6/91	1027	2.15	4.55
M15-02					
ToC	*6.89*	9/4/91	928	3.51	3.38
		11/6/91	1043	2.28	4.61
		11/6/91	1730	4.75	2.14
M15-03					
ToC	*8.67*	9/4/91	930	5.35	3.32
		11/6/91	1036	4.80	3.87
		11/6/91	1726	5.17	3.50

ToC - Top of Casing
Elevation datum - USGS Mean Low Low Water


Tidal Cycle During Water Level Measurement
Measurements taken between 928 and 936
September 4, 1991
6
4
2
12
4
8
Noon
4
8
12
Reference: 1991 Tidelogs
OAKLAND INNER HARBOR
-3.5
-3.75
-4.0
Estimated Direction of Groundwater Flow
M15-02
3.38
M15-01
4.14
M15-03
3.32
S15-47
S15-48
S15-49
S15-50
S15-51
S15-52
S15-53
S15-54
S15-55
S15-38
S15-39
S15-40
S15-41
S15-42
S15-43
S15-44
S15-45
S15-46
S15-29
S15-30
S15-31
S15-32
S15-33
S15-34
S15-35
S15-36
S15-37
S15-18
S15-19
S5-20
S-15-21
S15-22
S15-23
S15-24
S15-25
S15-26
S15-27
S15-28
S15-08
S15-09
S15-10
S15-11
S15-12
S15-13
S15-14
S15-15
S15-16
S5-17
S15-04
S15-05
S15-06
S15-07
S15-01
S15-02
S15-03
Bldg. 283
Bldg. 389
Bldg. 301
LEGEND:
Monitoring Well Location
3.38 Groundwater elevation (feet above mean low low water)
Surface Soil Sample Location
Site
Former Structure
Fence
Notes:
1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda
N
0
25
50
SCALE IN FEET
A-3
NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 15
GROUNDWATER CONTOUR MAP
SEPTEMBER 4, 1991
FIGURE 14-3


Tidal Cycle During Water Level Measurement
Measurements taken between 1027 and 1043
November 6, 1991
Ft
6
4
2
12
4
8
Noon
4
8
12
Reference: 1991 Tideloge
OAKLAND INNER HARBOR
M15-02
4.61
S15-47
S15-48
S15-49
S15-50
S15-51
S15-52
S15-53
S15-54
S15-55
S15-38
S15-39
S15-40
S15-41
S15-42
S15-43
S15-44
S15-45
S15-46
S15-29
S15-30
S15-31
S15-32
S15-33
S15-34
S15-35
S15-36
S15-37
S15-18
S15-19
S5-20
S-15-21
S15-22
S15-23
S15-24
S15-25
S15-26
S15-27
S15-28
S15-08
S15-09
S15-10
S15-11
S15-12
S15-13
S15-14
S15-15
S15-16
S5-17
S15-07
S15-06
S15-05
S15-04
S15-03
S15-02
S15-01
M15-01
4.55
M15-03
3.87
Bldg. 283
Bldg. 389
Bldg.301
4.5
4.25
4.0
Estimated Direction of Groundwater Flow
LEGEND:
Monitoring Well Location
4.55 Groundwater elevation in feet above mean low low water
Surface Soil Sample Location
Site
Former Structure
Fence
Notes:
1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda
0
25
50
SCALE IN FEET
A-3
NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 15
GROUNDWATER CONTOUR MAP
NOVEMBER 6, 1991
FIGURE 14-4

14.4.2 Analytical Results - Surface Soil Samples

Fifty-five surface locations were sampled at Site 15. A total of 61 samples were collected (55 samples plus six duplicates). Duplicate samples were collected from surface sample locations S15-01, S15-11, S15-17, S15-49, S15-51, and S15-54. Surface soil samples were analyzed for SVOCs, pesticides/PCBs, and metals. Analytical results are summarized in Tables 14-3 and 14-4 and can be found at the end of this section. Laboratory QA/QC data are summarized in the QCSR submitted under separate cover.

14.4.2.1 Semivolatile Organic Compounds. Analytical results for SVOCs are listed in Table 14-3. Five surface samples had detection limits an order of magnitude higher than the remaining samples. These high detection limits are the result of dilutions of the samples due to matrix interferences. The distribution of SVOCs is discussed below. SVOCs present at Site 15 in surface soil samples are classified as PAH and phthalates.

PAH were detected in 33 of the 61 surface soil samples and ranged in concentrations from 84 to 4,400 µg/kg. There is a conspicuous absence of PAH in the samples collected on the lines of samples starting with sample S15-31 and ending with sample S15-46.

Bis (2-ethylhexyl) phthalate was detected in 35 of the 61 samples at concentrations ranging from 100 to 3,800 µg/kg. Bis (2-ethylhexyl) phthalate was detected in three method blank samples and, thus, the results were qualified. Five of the samples are considered estimates. The remaining results are considered valid detections. Butylbenzylphthalate was detected in two of the 61 surface soil samples and ranged in concentrations from 110 to 120 µg/kg. Di-N-butylphthalate was detected in eight of the 61 surface soil samples and ranged in concentrations from 85 to 320 µg/kg, and the distribution is in the southern portion of the site.

14.4.2.2 Metals. As discussed in Section 3.0 of this report, background data for metals in soils at NAS Alameda have not been collected. Background data for metals in soil will be collected at a later date. An evaluation of the location and extent of possible metals contamination will be performed after the collection of background soil samples. Data generated in this investigation are presented below. As discussed in Section 3.0, the metals beryllium, chromium, copper, lead, mercury, and nickel have been tentatively identified as metals of concern. Analytical results for these metals are presented below. Analytical results for metals are listed in Table 14-4.

Beryllium was detected in 55 samples; concentrations ranged from 0.123 to 0.966 mg/kg. Chromium was detected in 61 soil samples; concentrations ranged from 15.5 to 174 mg/kg. Copper was detected in 61 soil samples; concentrations ranged from 6.95 to 325 mg/kg. Lead was detected in 61 soil samples; concentrations ranged from 5.52 to 1,350 mg/kg. Mercury was detected in 31 soil samples; concentrations ranged from 0.065 to 1.42 mg/kg. Nickel was detected in 61 soil samples; concentrations ranged from 9.56 to 1,040 mg/kg.

14.4.2.3 Pesticides/PCBs. Analytical results for pesticides/PCBs are listed in Table 14-3. The PCB Aroclor-1260 was detected in all but three of the surface soil samples at concentrations ranging from 140 to 19,000 µg/kg (one of the duplicate samples had a concentration of 52,000 µg/kg; the counterpart had a concentration of 2,900 µg/kg). The results are presented on Figure 14-5.

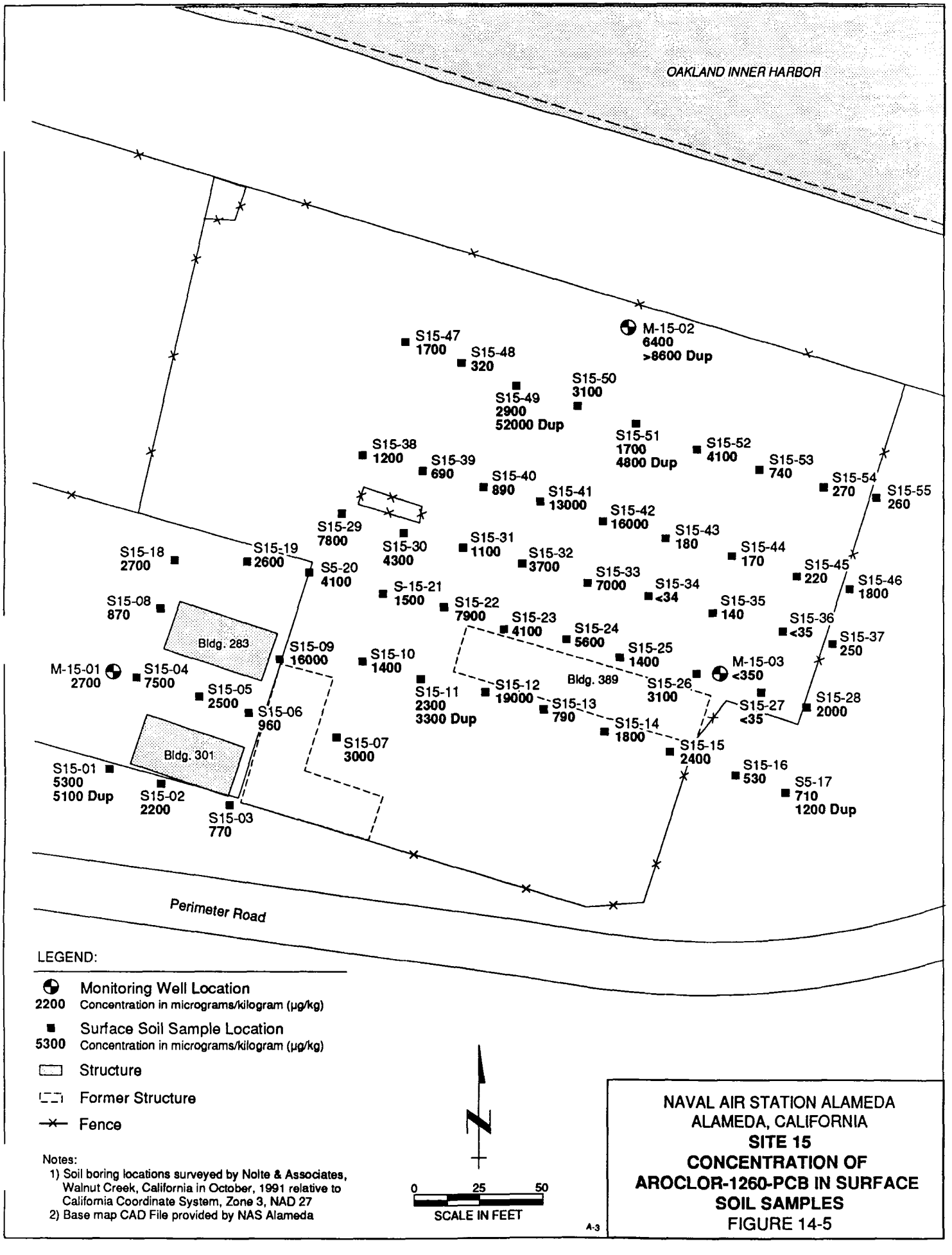
4,4-DDD was detected in four samples at concentrations ranging from 11.8 to 1,160 µg/kg. 4,4-DDE was detected in 17 samples at concentrations ranging from 16.8 to 315 µg/kg. 4,4-DDT was detected in 12 samples at concentrations ranging from 9.26 to 519 µg/kg. The pesticides 4,4-DDD, 4,4-DDE, 4,4-DDT were detected in samples collected in the vicinity of Building 301, and on the south side of former Building 389. The highest concentrations were in samples collected from the vicinity of Building 389.

Aldrin was detected in one sample at a concentration of 20.8 µg/kg. Dieldrin was detected in one sample at a concentration of 40.3 µg/kg. Endrin ketone was detected in one sample at a concentration of 9.62 µg/kg.

Alpha-chlordane was detected in 11 samples at concentrations ranging from 6.23 to 1,570 µg/kg. Delta-BHC was detected in two samples at concentrations ranging from 5.83 to 17.9 µg/kg. Gamma-BHC (Lindane) was detected in one sample at a concentration of 27.5 µg/kg. Gamma-chlordane was detected in 11 samples at concentrations ranging from 5.79 to 1,840 µg/kg. Alpha-chlordane, delta-BHC, gamma-BHC, and gamma-chlordane were detected in samples collected south of former Building 389 and south and east of Building 301.

14.4.3 Analytical Results - Soil Samples

A total of 14 soil samples were collected from the borings at Site 15, two of which were duplicates. Duplicate samples were collected from soil samples B-15-01-02 and B-15-02-00. Surface soil samples were analyzed for SVOCs, pesticides/PCBs, and metals. Subsurface soil samples were analyzed for these constituents plus VOCs. Analytical results are summarized in Tables 14-5 and 14-6 at the end of this section. Laboratory QA/QC data are summarized in the QCSR submitted under separate cover.


OAKLAND INNER HARBOR
S15-47 1700
S15-48 320
M-15-02 6400 >8600 Dup
S15-50 3100
S15-49 2900 52000 Dup
S15-51 1700 4800 Dup
S15-52 4100
S15-53 740
S15-54 270
S15-55 260
S15-38 1200
S15-39 690
S15-40 890
S15-41 13000
S15-42 16000
S15-43 180
S15-44 170
S15-45 220
S15-46 1800
S15-29 7800
S15-30 4300
S15-31 1100
S15-32 3700
S15-33 7000
S15-34 <34
S15-35 140
S15-36 <35
S15-37 250
S15-18 2700
S15-19 2600
S5-20 4100
S-15-21 1500
S15-22 7900
S15-23 4100
S15-24 5600
S15-25 1400
S15-26 3100
S15-27 <35
S15-28 2000
S15-08 870
Bldg. 283
S15-09 16000
S15-10 1400
M-15-01 2700
S15-04 7500
S15-05 2500
S15-06 960
S15-11 2300 3300 Dup
S15-12 19000
S15-13 790
S15-14 1800
Bldg. 389
M-15-03 <350
S15-15 2400
S15-16 530
S5-17 710 1200 Dup
Bldg. 301
S15-01 5300 5100 Dup
S15-02 2200
S15-03 770
S15-07 3000
Perimeter Road
LEGEND:
Monitoring Well Location
2200 Concentration in micrograms/kilogram (µg/kg)
Surface Soil Sample Location
5300 Concentration in micrograms/kilogram (µg/kg)
Structure
Former Structure
Fence
Notes:
1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda
0 25 50
SCALE IN FEET
A-3
NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 15
CONCENTRATION OF
AROCLOR-1260-PCB IN SURFACE
SOIL SAMPLES
FIGURE 14-5

Selected samples were also analyzed for total organic carbon content (TOC) and soil pH (Section 3.0 has selection criteria). TOC and soil pH data will be used in the feasibility study; therefore, they are not discussed in this report. Analytical results for these parameters are summarized in Appendix B.

14.4.3.1 Volatile Organic Compounds. Acetone was detected in eight of the 10 soil samples from the borings at Site 15. It was detected in soil samples from various depths, ranging from 2 to 14 feet below ground surface in all of the borings. The concentrations ranged from 13 to 38 µg/kg. Acetone was not detected in any of the method blanks analyzed from Site 15.

Methylene chloride was detected in three of the 10 soil samples from the borings at Site 15. It was detected in the soil sample collected at 2 feet below ground surface in boring M-15-02, the soil samples collected from boring M-15-03 from 8 and 14 feet. The concentrations ranged from 5.9 to 7.1 µg/kg.

14.4.3.2 Semivolatile Organic Compounds. SVOCs were detected in soil samples from all of the borings at Site 15. The distribution of these types of SVOCs are presented in the following discussion. Analytical results for SVOCs are summarized in Table 14-5. SVOCs present at Site 15 in soil samples are classified as PAH, phthalates, phenols, and amine.

PAH were detected in four of the 14 soil samples and ranged in concentrations from 100 to 1,100 µg/kg. PAH are present in the surface sample at each boring location and in the sample collected from 2 feet in boring M-15-01.

Bis (2-ethylhexyl) phthalate is present in the 8-foot soil sample from boring B-15-01 and the surface sample from boring B-15-02 at concentrations of 520 and 300 µg/kg, respectively.

Phenols were detected in the soil sample collected at 2 feet from boring M-15-01 and ranged in concentrations from 1,800 to 2,000 µg/kg. These compounds were not detected in the duplicate sample. N-nitrosodi-N-propylamine was detected in the soil sample collected at 2 feet from boring M-15-01 at a concentration of 870 µg/kg.

14.4.3.3 Metals. As discussed in Section 3.0 of this report, background data for metals in soils at NAS Alameda have not been collected. Background data for metals in soil will be collected at a later date. An evaluation of the location and extent of possible metals contamination will be performed after the collection of background soil samples. Data generated in this investigation are presented below. As discussed in Section 3.0, the metals beryllium, chromium, copper, lead, mercury, and nickel have been

tentatively identified as metals of concern. Analytical results for these metals are presented below. Analytical results for metals are listed in Table 14-6.

Beryllium was detected in 13 samples; concentrations ranged from 0.29 to 1.05 mg/kg. Chromium was detected in 13 soil samples; concentrations ranged from 18.3 to 70.1 mg/kg. Copper was detected in 13 soil samples; concentrations ranged from 2.89 to 38.8 mg/kg. Lead was detected in 13 soil samples; concentrations ranged from 1.68 to 192 mg/kg. Mercury was detected in four soil samples; concentrations ranged from 0.058 to 0.188 mg/kg. Nickel was detected in 13 soil samples; concentrations ranged from 13.4 to 89.8 mg/kg.

14.4.3.4 Pesticides/PCBs. Aroclor-1260 was detected in the surface soil samples from borings B-15-01 and B-15-02 at concentrations of 2,700 and 6,400 µg/kg, respectively.

14.4.4 Analytical Results - Groundwater Samples

Groundwater samples were collected from the three wells installed at Site 15 on September 4, 1991. Groundwater samples were analyzed for VOCs, SVOCs, pesticides/PCBs, TRPH, and metals. Analytic results for groundwater are summarized in Tables 14-7 and 14-8 at the end of this section. Laboratory QA/QC data are summarized in the QCSR submitted under separate cover.

14.4.4.1 Volatile Organic Compounds. VOCs and TRPH were not detected in the groundwater samples collected from any of the wells at Site 15.

14.4.4.2 Semivolatile Organic Compounds. SVOCs were not detected in the groundwater samples collected from any of the wells at Site 15.

14.4.4.3 Metals. Analytical results for metals in groundwater are summarized in Table 14-8. Presently, there are no base-specific background metals data for comparison purposes. Background data will be collected at a later date and an evaluation of metals data will be included in the Phase 7 comprehensive RI report.

14.4.4.4 Pesticides/PCBs. Pesticides/PCBs were not detected in the groundwater samples collected from any of the wells at Site 15.

14.4.4.5 General Chemicals. Analytical results for general chemicals, pH, and TOC are summarized in Table 14-9. Groundwater conductivity was measured during sampling of the wells and

ranged from 6,000 to 28,000 micro-mhos per centimeter. This indicates that the groundwater at this site is brackish to saline in character (Driscoll, 1986). Groundwater pH values are 7.0.

TABLE 14-3
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	S15-01	Duplicate S15-01	S15-02	S15-03	S15-04	S15-05	S15-06	S15-07
Date Sampled	07/23/91	07/23/91	07/23/91	07/23/91	07/23/91	07/23/91	07/23/91	07/22/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
PESTICIDES/PCBS (µg/kg-dry)								
4,4'-DDD	< 66.9	< 33.5	< 33.5	11.8J	< 33.8	< 34.1	< 6.74	< 33.5
4,4'-DDE	< 33.5	< 16.7	27.3J	20.3J	108J	51.7J	16.8J	50.3J
4,4'-DDT	< 66.9	< 33.5	< 33.5	52.7J	64.4J	68.7J	9.26J	< 33.5
Aldrin	< 33.5	< 16.7	< 16.8	< 3.34	< 16.9	< 17.1	20.8J	< 16.8
Aroclor-1260	5300J	5100J	2200J	770J	7500J	2500J	960J	3000J
Dieldrin	< 33.5	< 16.7	< 16.8	< 3.34	< 16.9	< 17.1	< 3.37	< 16.8
Endrin ketone	< 66.9	< 33.5	< 33.5	< 6.69	< 33.8	< 34.1	< 6.74	< 33.5
alpha-Chlordane	< 33.5	< 16.7	< 16.8	60.2J	< 16.9	< 17.1	6.23J	45.1J
delta-BHC	< 33.5	< 16.7	< 16.8	5.83J	< 16.9	< 17.1	17.9J	< 16.8
gamma-BHC (Lindane)	< 16.7	< 8.37	< 8.38	< 1.67	< 8.45	< 8.53	< 1.69	< 8.38
gamma-Chlordane	< 33.5	< 16.7	< 16.8	43.7J	< 16.9	< 17.1	5.79J	29.6J
SEMIVOLATILE ORGANICS (µg/kg-dry)								
ACENAPHTHYLENE	< 80	< 80	< 80	< 80	< 81	< 82	< 81	< 70
ANTHRACENE	< 80	< 80	< 80	< 80	< 81	< 82	110	< 70
BENZO(A)ANTHRACENE	< 100	< 100	110	< 100	230	110	520	< 100
BENZO(A)PYRENE	< 140	< 140	< 140	< 140	200	< 140	530	< 140
BENZO(B)FLUORANTHENE	100	210	270	150	400	240	830	< 100
BENZO(GHI)PERYLENE	< 160	< 160	< 160	< 160	< 160	< 160	< 160	< 160
BENZO(K)FLUORANTHENE	< 100	< 100	130	< 100	110	< 100	290	< 100
BIS(2-ETHYLHEXYL)PHTHALATE	330	1100	860	2000	820	280	670	410
BUTYLBENZYLPHTHALATE	< 100	< 100	< 100	< 100	< 100	< 100	110	< 100
CHRYSENE	120	150	160	110	320	150	590	< 100
DI-N-BUTYL PHTHALATE	< 80	< 80	120	< 80	< 81	< 82	170	< 70
FLUORANTHENE	180	310	220	160	410	190	1000	< 70
FLUORENE	< 80	< 80	< 80	< 80	< 81	< 82	< 81	< 70
INDENO(1,2,3-CD)PYRENE	< 160	< 160	< 160	< 160	< 160	< 160	< 160	< 160
PHENANTHRENE	120	94	< 80	< 80	110	< 82	490	< 70
PYRENE	190	140	150	99	270	140	650	< 70

Notes: < = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-3
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	S15-08	S15-09	S15-10	S15-11	Duplicate S15-11	S15-12	S15-13	S15-14
Date Sampled	07/23/91	07/23/91	07/22/91	07/22/91	07/22/91	07/22/91	07/22/91	07/22/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
PESTICIDES/PCBS (µg/kg-dry)								
4,4'-DDD	< 6.69	1160J	< 33.6	< 67.3	97.6J	< 67.3	< 6.70	25.5J
4,4'-DDE	< 3.35	144J	47.1J	220J	176J	315J	23.9J	43.2J
4,4'-DDT	< 6.69	< 6.73	85.2J	519J	430J	186J	10.3J	88.0J
Aldrin	< 3.35	< 3.36	< 16.8	< 33.6	< 33.7	< 33.7	< 3.35	< 3.35
Aroclor-1260	8700J	16000J	1400J	2300J	3300J	19000J	790J	1800J
Dieldrin	< 3.35	< 3.36	< 16.8	40.3J	< 33.7	< 33.7	< 3.35	< 3.35
Endrin ketone	< 6.69	< 6.73	< 33.6	< 67.3	< 67.4	< 67.3	< 6.70	< 6.70
alpha-Chlordane	< 3.35	157QJ	308J	1050J	905J	213J	23.2J	43.8J
delta-BHC	< 3.35	< 3.36	< 16.8	< 33.6	< 33.7	< 33.7	< 3.35	< 3.35
gamma-BHC (Lindane)	< 1.67	< 1.68	< 8.40	< 16.8	< 16.9	< 16.8	< 1.68	27.5J
gamma-Chlordane	< 3.35	1840J	228J	759J	659J	156J	18.0J	30.3J
SEMIVOLATILE ORGANICS (µg/kg-dry)								
ACENAPHTHYLENE	250	< 81	< 1400	< 71	< 71	< 1400	< 70	< 70
ANTHRACENE	470	84	< 1400	< 71	< 71	< 1400	< 70	< 70
BENZO(A)ANTHRACENE	1900	310	2200	< 100	180	< 2000	< 100	< 100
BENZO(A)PYRENE	1200	430	< 2800	< 140	190	< 2800	< 140	< 140
BENZO(B)FLUORANTHENE	1900	940	4100	750	590	< 2000	210	< 100
BENZO(GHI)PERYLENE	570	230	< 3200	< 160	< 160	< 3200	< 160	< 160
BENZO(K)FLUORANTHENE	390	260	< 2000	< 100	< 100	< 2000	< 100	< 100
BIS(2-ETHYLHEXYL)PHTHALATE	630	1700	< 2000	480	400	< 2000	150	< 100
BUTYLBENZYLPHTHALATE	< 100	< 100	< 2000	< 100	120	< 2000	< 100	< 100
CHRYSENE	1600	480	2400	330	300	< 2000	< 100	< 100
DI-N-BUTYL PHTHALATE	< 80	120	< 1400	85	110	< 1400	130	< 70
FLUORANTHENE	3300	630	4400	350	280	< 1400	180	160
FLUORENE	86	< 81	< 1400	< 71	< 71	< 1400	< 70	< 70
INDENO(1,2,3-CD)PYRENE	680	180	< 3200	< 160	< 160	< 3200	< 160	< 160
PHENANTHRENE	1900	250	1700	190	160	< 1400	< 70	110
PYRENE	2200	490	3300	300	270	< 1400	< 70	240

Notes: < = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-3
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	S15-15	S15-16	S15-17	Duplicate S15-17	S15-18	S15-19	S15-20	S15-21
Date Sampled	07/23/91	07/24/91	07/24/91	07/24/91	07/23/91	07/23/91	07/22/91	07/22/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
PESTICIDES/PCBS (µg/kg-dry)								
4,4'-DDD	< 6.71	< 6.90	< 6.78	< 6.89	< 6.71	< 6.70	< 33.5	< 6.71
4,4'-DDE	< 3.36	< 3.45	< 3.39	< 3.44	< 3.35	< 3.35	52.4J	22.6J
4,4'-DDT	< 6.71	< 6.90	< 6.78	< 6.89	< 6.71	< 6.70	< 33.5	26.7J
Aldrin	< 3.36	< 3.45	< 3.39	< 3.44	< 3.35	< 3.35	< 16.7	< 3.35
Aroclor-1260	2400J	530J	710J	1200J	2700J	2600J	4100J	1500J
Dieldrin	< 3.36	< 3.45	< 3.39	< 3.44	< 3.35	< 3.35	< 16.7	< 3.35
Endrin ketone	< 6.71	< 6.90	< 6.78	< 6.89	< 6.71	< 6.70	< 33.5	< 6.71
alpha-Chlordane	46.3J	< 3.45	< 3.39	< 3.44	< 3.35	< 3.35	< 16.7	< 3.35
delta-BHC	< 3.36	< 3.45	< 3.39	< 3.44	< 3.35	< 3.35	< 16.7	< 3.35
gamma-BHC (Lindane)	< 1.68	< 1.73	< 1.70	< 1.72	< 1.68	< 1.68	< 8.37	< 1.68
gamma-Chlordane	42.1J	< 3.45	< 3.39	< 3.44	< 3.35	< 3.35	< 16.7	< 3.35
SEMIVOLATILE ORGANICS (µg/kg-dry)								
ACENAPHTHYLENE	< 81	< 83	< 81	< 83	< 80	< 80	< 70	< 70
ANTHRACENE	< 81	< 83	< 81	< 83	< 80	< 80	< 70	< 70
BENZO(A)ANTHRACENE	< 100	< 100	< 100	< 100	< 100	180	< 100	< 100
BENZO(A)PYRENE	< 140	< 140	< 140	< 140	< 140	250	< 140	< 140
BENZO(B)FLUORANTHENE	110	< 100	< 100	110J	170	480	< 100	< 100
BENZO(GHI)PERYLENE	< 160	< 170	< 160	< 170	< 160	< 160	< 160	< 160
BENZO(K)FLUORANTHENE	< 100	< 100	< 100	< 100	< 100	120	< 100	< 100
BIS(2-ETHYLHEXYL)PHTHALATE	1900	< 100	< 100	200J	650	3800	570	320
BUTYLBENZYLPHTHALATE	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
CHRYSENE	< 100	< 100	110J	< 100	100	230	< 100	140
DI-N-BUTYL PHTHALATE	320	< 83	< 81	< 83	< 80	< 80	160	< 70
FLUORANTHENE	110	< 83	< 81	< 83	150	380	160	88
FLUORENE	< 81	< 83	< 81	< 83	< 80	< 80	< 70	< 70
INDENO(1,2,3-CD)PYRENE	< 160	< 170	< 160	< 170	< 160	< 160	< 160	< 160
PHENANTHRENE	< 81	< 83	< 81	< 83	< 80	110	< 70	< 70
PYRENE	< 81	< 83	< 81	< 83	98	260	300	150

Notes: < = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-3
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	S15-22	S15-23	S15-24	S15-25	S15-26	S15-27	S15-28	S15-29
Date Sampled	07/22/91	07/22/91	07/23/91	07/24/91	07/23/91	07/24/91	07/24/91	07/22/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
PESTICIDES/PCBS (µg/kg-dry)								
4,4'-DDD	< 67.2	< 67.0	< 6.72	< 6.97	< 6.68	< 7.00	< 6.69	< 67.0
4,4'-DDE	< 33.6	< 33.5	< 3.36	< 3.49	< 3.34	< 3.50	< 3.35	< 33.5
4,4'-DDT	< 67.2	< 67.0	< 6.72	< 6.97	< 6.68	< 7.00	< 6.69	< 67.0
Aldrin	< 33.6	< 33.5	< 3.36	< 3.49	< 3.34	< 3.50	< 3.35	< 33.5
Aroclor-1260	7900J	4100J	5600J	1400J	3100J	< 35	2000J	7800J
Dieldrin	< 33.6	< 33.5	< 3.36	< 3.49	< 3.34	< 3.50	< 3.35	< 33.5
Endrin ketone	< 67.2	< 67.0	< 6.72	< 6.97	< 6.68	< 7.00	< 6.69	< 67.0
alpha-Chlordane	< 33.6	< 33.5	< 3.36	< 3.49	< 3.34	< 3.50	< 3.35	< 33.5
delta-BHC	< 33.6	< 33.5	< 3.36	< 3.49	< 3.34	< 3.50	< 3.35	< 33.5
gamma-BHC (Lindane)	< 16.8	< 16.8	< 1.68	< 1.74	< 1.67	< 1.75	< 1.67	< 16.8
gamma-Chlordane	< 33.6	< 33.5	< 3.36	< 3.49	< 3.34	< 3.50	< 3.35	< 33.5
SEMIVOLATILE ORGANICS (µg/kg-dry)								
ACENAPHTHYLENE	< 81	< 1600	< 81	< 84	< 80	< 84	< 80	< 800
ANTHRACENE	< 81	< 1600	91	< 84	< 80	< 84	< 80	< 800
BENZO(A)ANTHRACENE	< 100	< 2000	280	< 100	< 100	< 100	< 100	< 1000
BENZO(A)PYRENE	< 140	< 2800	260	< 150	< 140	< 150	< 140	< 1400
BENZO(B)FLUORANTHENE	< 100	< 2000	460	< 100	< 100	< 100	350J	< 1000
BENZO(GHI)PERYLENE	< 160	< 3200	< 160	< 170	< 160	< 170	< 160	< 1600
BENZO(K)FLUORANTHENE	< 100	< 2000	< 100	< 100	< 100	< 100	140J	< 1000
BIS(2-ETHYLHEXYL)PHTHALATE	< 100	< 2000	450	220J	100	< 100	370J	< 1000
BUTYLBENZYLPHTHALATE	< 100	< 2000	< 100	< 100	< 100	< 100	< 100	< 1000
CHRYSENE	< 100	< 2000	390	< 100	< 100	< 100	180J	< 1000
DI-N-BUTYL PHTHALATE	< 81	< 1600	< 81	< 84	< 80	< 84	< 80	< 800
FLUORANTHENE	< 81	< 1600	300	< 84	< 80	< 84	170J	< 800
FLUORENE	< 81	< 1600	< 81	< 84	< 80	< 84	< 80	< 800
INDENO(1,2,3-CD)PYRENE	< 160	< 3200	< 160	< 170	< 160	< 170	< 160	< 1600
PHENANTHRENE	< 81	< 1600	110	130J	< 80	< 84	< 80	< 800
PYRENE	< 81	< 1600	520	120J	< 80	< 84	210J	< 800

Notes: < = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-3
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	S15-30	S15-31	S15-32	S15-33	S15-34	S15-35	S15-36	S15-37
Date Sampled	07/22/91	07/22/91	07/22/91	07/23/91	07/24/91	07/24/91	07/24/91	07/24/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
PESTICIDES/PCBS (µg/kg-dry)								
4,4'-DDD	< 67.3	< 6.73	< 67.0	< 6.72	< 6.76	< 6.94	< 6.98	< 6.78
4,4'-DDE	< 33.6	< 3.37	< 33.5	< 3.36	< 3.38	< 3.47	< 3.49	< 3.39
4,4'-DDT	< 67.3	< 6.73	< 67.0	< 6.72	< 6.76	9.95	< 6.98	< 6.78
Aldrin	< 33.6	< 3.37	< 33.5	< 3.36	< 3.38	< 3.47	< 3.49	< 3.39
Aroclor-1260	4300J	1100J	3700J	7000J	< 34	140	< 35	250
Dieldrin	< 33.6	< 3.37	< 33.5	< 3.36	< 3.38	< 3.47	< 3.49	< 3.39
Endrin ketone	< 67.3	< 6.73	< 67.0	< 6.72	< 6.76	9.62	< 6.98	< 6.78
alpha-Chlordane	< 33.6	< 3.37	< 33.5	< 3.36	< 3.38	< 3.47	< 3.49	< 3.39
delta-BHC	< 33.6	< 3.37	< 33.5	< 3.36	< 3.38	< 3.47	< 3.49	< 3.39
gamma-BHC (Lindane)	< 16.8	< 1.68	< 16.8	< 1.68	< 1.69	< 1.74	< 1.75	< 1.69
gamma-Chlordane	< 33.6	< 3.37	< 33.5	< 3.36	< 3.38	< 3.47	< 3.49	< 3.39
SEMIVOLATILE ORGANICS (µg/kg-dry)								
ACENAPHTHYLENE	< 81	< 81	< 80	< 81	< 81	< 83	< 420	< 410
ANTHRACENE	< 81	< 81	< 80	< 81	< 81	< 83	< 420	< 410
BENZO(A)ANTHRACENE	< 100	< 100	< 100	< 100	< 100	< 100	< 520	< 510
BENZO(A)PYRENE	< 140	< 140	< 140	< 140	< 140	< 150	< 730	< 710
BENZO(B)FLUORANTHENE	< 100	< 100	< 100	< 100	< 100	< 100	< 520	< 510
BENZO(GHI)PERYLENE	< 160	< 160	< 160	< 160	< 160	< 170	< 840	< 810
BENZO(K)FLUORANTHENE	< 100	< 100	< 100	< 100	< 100	< 100	< 520	< 510
BIS(2-ETHYLHEXYL)PHTHALATE	130	< 100	< 100	2300	< 100	< 100	< 520	< 510
BUTYLBENZYLPHTHALATE	< 100	< 100	< 100	< 100	< 100	< 100	< 520	< 510
CHRYSENE	< 100	< 100	< 100	< 100	< 100	< 100	< 520	< 510
DI-N-BUTYL PHTHALATE	< 81	< 81	< 80	< 81	< 81	< 83	< 420	< 410
FLUORANTHENE	< 81	< 81	< 80	< 81	< 81	< 83	< 420	< 410
FLUORENE	< 81	< 81	< 80	< 81	< 81	< 83	< 420	< 410
INDENO(1,2,3-CD)PYRENE	< 160	< 160	< 160	< 160	< 160	< 170	< 840	< 810
PHENANTHRENE	< 81	< 81	< 80	< 81	< 81	< 83	< 420	< 410
PYRENE	94	< 81	< 80	< 81	< 81	< 83	< 420	< 410

Notes: < = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-3
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	S15-38	S15-39	S15-40	S15-41	S15-42	S15-43	S15-44	S15-45
Date Sampled	07/22/91	07/22/91	07/22/91	07/22/91	07/23/91	07/24/91	07/24/91	07/24/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
PESTICIDES/PCBS (µg/kg-dry)								
4,4'-DDD	< 6.71	< 6.75	< 6.73	< 66.9	< 66.9	< 6.94	< 6.94	< 6.94
4,4'-DDE	< 3.35	< 3.37	< 3.36	170J	198J	< 3.47	< 3.47	< 3.47
4,4'-DDT	< 6.71	< 6.75	< 6.73	< 66.9	< 66.9	< 6.94	< 6.94	< 6.94
Aldrin	< 3.35	< 3.37	< 3.36	< 33.5	< 33.5	< 3.47	< 3.47	< 3.47
Aroclor-1260	1200J	690J	890J	13000J	16000J	180	170	220
Dieldrin	< 3.35	< 3.37	< 3.36	< 33.5	< 33.5	< 3.47	< 3.47	< 3.47
Endrin ketone	< 6.71	< 6.75	< 6.73	< 66.9	< 66.9	< 6.94	< 6.94	< 6.94
alpha-Chlordane	< 3.35	< 3.37	< 3.36	< 33.5	< 33.5	< 3.47	< 3.47	< 3.47
delta-BHC	< 3.35	< 3.37	< 3.36	< 33.5	< 33.5	< 3.47	< 3.47	< 3.47
gamma-BHC (Lindane)	< 1.68	< 1.69	< 1.68	< 16.7	< 16.7	< 1.73	< 1.73	< 1.74
gamma-Chlordane	< 3.35	< 3.37	< 3.36	< 33.5	< 33.5	< 3.47	< 3.47	< 3.47
SEMIVOLATILE ORGANICS (µg/kg-dry)								
ACENAPHTHYLENE	< 80	< 81	< 81	< 160	< 400	< 420	< 420	< 420
ANTHRACENE	< 80	< 81	< 81	< 160	< 400	< 420	< 420	< 420
BENZO(A)ANTHRACENE	< 100	< 100	< 100	< 200	< 500	< 520	< 520	< 520
BENZO(A)PYRENE	< 140	< 140	< 140	< 280	< 700	< 730	< 730	< 730
BENZO(B)FLUORANTHENE	< 100	< 100	< 100	< 200	< 500	< 520	< 520	< 520
BENZO(GHI)PERYLENE	< 160	< 160	< 160	< 320	< 800	< 830	< 830	< 830
BENZO(K)FLUORANTHENE	< 100	< 100	< 100	< 200	< 500	< 520	< 520	< 520
BIS(2-ETHYLHEXYL)PHTHALATE	< 100	< 100	< 100	< 200	< 500	< 520	< 520	< 520
BUTYLBENZYLPHTHALATE	< 100	< 100	< 100	< 200	< 500	< 520	< 520	< 520
CHRYSENE	< 100	< 100	< 100	< 200	< 500	< 520	< 520	< 520
DI-N-BUTYL PHTHALATE	< 80	< 81	< 81	< 160	< 400	< 420	< 420	< 420
FLUORANTHENE	< 80	< 81	< 81	< 160	< 400	< 420	< 420	< 420
FLUORENE	< 80	< 81	< 81	< 160	< 400	< 420	< 420	< 420
INDENO(1,2,3-CD)PYRENE	< 160	< 160	< 160	< 320	< 800	< 830	< 830	< 830
PHENANTHRENE	< 80	< 81	< 81	< 160	< 400	< 420	< 420	< 420
PYRENE	< 80	< 81	< 81	< 160	< 400	< 420	< 420	< 420

Notes: < = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-3
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	S15-46	S15-47	S15-48	S15-49	Duplicate S15-49	S15-50	S15-51	Duplicate S15-51
Date Sampled	07/24/91	07/22/91	07/22/91	07/22/91	07/22/91	07/22/91	07/23/91	07/23/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
PESTICIDES/PCBS (µg/kg-dry)								
4,4'-DDD	< 6.70	< 6.71	< 6.72	< 6.69	< 67.1	< 6.69	< 6.78	< 6.76
4,4'-DDE	< 3.35	< 3.35	< 3.36	< 3.35	< 33.6	< 3.35	< 3.39	< 3.38
4,4'-DDT	< 6.70	< 6.71	< 6.72	< 6.69	< 67.1	< 6.69	< 6.78	< 6.76
Aldrin	< 3.35	< 3.35	< 3.36	< 3.35	< 33.6	< 3.35	< 3.39	< 3.38
Aroclor-1260	1800	1700J	320J	2900J	52000J	3100J	1700J	4800J
Dieldrin	< 3.35	< 3.35	< 3.36	< 3.35	< 33.6	< 3.35	< 3.39	< 3.38
Endrin ketone	< 6.70	< 6.71	< 6.72	< 6.69	< 67.1	< 6.69	< 6.78	< 6.76
alpha-Chlordane	< 3.35	< 3.35	< 3.36	< 3.35	< 33.6	< 3.35	< 3.39	< 3.38
delta-BHC	< 3.35	< 3.35	< 3.36	< 3.35	< 33.6	< 3.35	< 3.39	< 3.38
gamma-BHC (Lindane)	< 1.68	< 1.68	< 1.68	< 1.67	< 16.8	< 1.67	< 1.69	< 1.69
gamma-Chlordane	< 3.35	< 3.35	< 3.36	< 3.35	< 33.6	< 3.35	< 3.39	< 3.38
SEMIVOLATILE ORGANICS (µg/kg-dry)								
ACENAPHTHYLENE	< 400	< 160	< 81	< 80	< 81	< 80	< 71	< 81
ANTHRACENE	< 400	< 160	< 81	< 80	< 81	< 80	< 71	< 81
BENZO(A)ANTHRACENE	< 500	< 200	< 100	< 100	< 100	< 100	< 100	< 100
BENZO(A)PYRENE	< 700	< 280	< 140	< 140	< 140	< 140	< 140	< 140
BENZO(B)FLUORANTHENE	< 500	< 200	< 100	< 100	< 100	< 100	< 100	< 100
BENZO(GHI)PERYLENE	< 800	< 320	< 160	< 160	< 160	< 160	< 160	< 160
BENZO(K)FLUORANTHENE	< 500	< 200	< 100	< 100	< 100	< 100	< 100	< 100
BIS(2-ETHYLHEXYL)PHTHALATE	< 500	1000J	< 100	1000	410	220	240	180
BUTYLBENZYLPHTHALATE	< 500	< 200	< 100	< 100	< 100	< 100	< 100	< 100
CHRYSENE	< 500	< 200	< 100	< 100	< 100	< 100	< 100	< 100
DI-N-BUTYL PHTHALATE	< 400	< 160	< 81	< 80	< 81	< 80	< 71	< 81
FLUORANTHENE	< 400	< 160	< 81	180	< 81	110	< 71	< 81
FLUORENE	< 400	< 160	< 81	< 80	< 81	< 80	< 71	< 81
INDENO(1,2,3-CD)PYRENE	< 800	< 320	< 160	< 160	< 160	< 160	< 160	< 160
PHENANTHRENE	< 400	< 160	< 81	< 80	< 81	< 80	< 71	< 81
PYRENE	< 400	< 160	< 81	110	120	170	< 71	88

Notes: < = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-3
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	S15-52	S15-53	S15-54	Duplicate S15-54	S15-55
Date Sampled	07/24/91	07/23/91	07/23/91	07/23/91	07/24/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED					
PESTICIDES/PCBS (µg/kg-dry)					
4,4'-DDD	< 6.75	< 6.70	< 6.70	< 6.69	< 6.72
4,4'-DDE	< 3.37	< 3.35	< 3.35	< 3.35	< 3.36
4,4'-DDT	< 6.75	< 6.70	< 6.70	< 6.69	< 6.72
Aldrin	< 3.37	< 3.35	< 3.35	< 3.35	< 3.36
Aroclor-1260	4100J	740	270	260	2100
Dieldrin	< 3.37	< 3.35	< 3.35	< 3.35	< 3.36
Endrin ketone	< 6.75	< 6.70	< 6.70	< 6.69	< 6.72
alpha-Chlordane	< 3.37	< 3.35	< 3.35	< 3.35	< 3.36
delta-BHC	< 3.37	< 3.35	< 3.35	< 3.35	< 3.36
gamma-BHC (Lindane)	< 1.69	< 1.68	< 1.68	< 1.67	< 1.68
gamma-Chlordane	< 3.37	< 3.35	< 3.35	< 3.35	< 3.36
SEMIVOLATILE ORGANICS (µg/kg-dry)					
ACENAPHTHYLENE	< 1600	< 80	< 80	< 80	< 81
ANTHRACENE	< 1600	< 80	< 80	< 80	< 81
BENZO(A)ANTHRACENE	< 2000	120	< 100	< 100	110J
BENZO(A)PYRENE	< 2800	150	< 140	< 140	< 140
BENZO(B)FLUORANTHENE	< 2000	200	< 100	< 100	310J
BENZO(GHI)PERYLENE	< 3200	< 160	< 160	< 160	< 160
BENZO(K)FLUORANTHENE	< 2000	< 100	< 100	< 100	< 100
BIS(2-ETHYLHEXYL)PHTHALATE	< 2000	210	200J	130	340J
BUTYLBENZYLPHTHALATE	< 2000	< 100	< 100	< 100	< 100
CHRYSENE	< 2000	150	< 100	120	220J
DI-N-BUTYL PHTHALATE	< 1600	< 80	< 80	< 80	< 81
FLUORANTHENE	< 1600	270	210J	170	260J
FLUORENE	< 1600	< 80	< 80	< 80	< 81
INDENO(1,2,3-CD)PYRENE	< 3200	< 160	< 160	< 160	< 160
PHENANTHRENE	< 1600	140	150J	130	110J
PYRENE	< 1600	180	110J	220	390J

Notes: < = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.
J = Qualified, estimated value
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-4
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	S15-01	Duplicate S15-01	S15-02	S15-03	S15-04	S15-05	S15-06	S15-07
Date Sampled	07/23/91	07/23/91	07/23/91	07/23/91	07/23/91	07/23/91	07/23/91	07/22/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	3830J	4830J	3960J	4030J	8930J	11100J	6990J	8310J
ANTIMONY	2.8	4.1	4.6	3.0	5.0	4.3	3.5	6.7J
ARSENIC	2.06J	2.86J	2.26J	2.13J	4.91J	6.47J	4.20J	5.73J
BARIUM	47.5J	79.8	52.9J	48.8J	110J	120J	67.0J	96.5J
BERYLLIUM	< 0.130	0.330	0.502	0.351	0.596	0.709	0.496	0.847
CADMIUM	2.48	2.88	2.18	4.53	2.03	1.10	3.53	4.82
CALCIUM	7000J	7350J	5120J	9740J	13400J	18000J	8750J	12900J
CHROMIUM, TOTAL	32.4J	41.5	40.7J	34.7J	46.1J	45.2J	45.2J	141J
COBALT	4.17	5.46	4.31	4.55	7.58	8.76	6.45	10.4
COPPER	20.8J	24.8	19.1J	22.4J	33.0J	33.9J	24.2J	325
IRON	7900J	10200J	8650J	9030J	17200J	19600J	14600J	24000J
LEAD	175J	168	726J	188J	309J	130J	160J	210
MAGNESIUM	2040	2450	1920	2110	4790	5900	3580	6540
MANGANESE	131J	151J	117J	137J	264J	328J	207J	335
MERCURY	< 0.096	< 0.099	0.147J	0.151J	0.158J	0.174J	0.113J	0.252J
NICKEL	23.0	24.5	22.8	27.3	32.7	40.4	32.4	1040
POTASSIUM	563	637J	591	538	1100	1400	966	852
SELENIUM	< 0.208UJ	< 0.181UJ	< 0.195UJ	< 0.209UJ	< 0.200UJ	< 0.182UJ	< 0.184UJ	< 0.204UJ
SILVER	< 0.492	0.604	0.501	0.571	0.524	0.568	0.435	1.57
SODIUM	204	383J	321	320	857	1190	429	518
THALLIUM	< 0.268	< 0.233	< 0.251	< 0.268	0.371	< 0.234	0.315	< 0.262
VANADIUM	18.0	23.9	19.6	21.7	31.5	37.3	25.6	38.4
ZINC	567	655	1220	673	203	157	432	455J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-4
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	S15-08	S15-09	S15-10	S15-11	Duplicate S15-11	S15-12	S15-13	S15-14
Date Sampled	07/23/91	07/23/91	07/22/91	07/22/91	07/22/91	07/22/91	07/22/91	07/22/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	6400J	7260J	5860J	5680J	5140J	6490J	5790J	5590J
ANTIMONY	9.2	17	7.0J	6.2J	6.4J	6.9J	4.3J	3.9J
ARSENIC	3.36J	4.01J	2.66J	2.95J	3.48J	2.33J	3.08J	2.49J
BARIUM	109J	117J	65.2J	52.2J	47.5J	59.0J	44.5J	61.8J
BERYLLIUM	0.420	0.482	0.877	0.732	0.737	0.797	0.622	0.591
CADMIUM	4.88	17.8	10.4	4.90	5.12	11.8	4.27	5.84
CALCIUM	6940J	3850J	3160J	3190J	3130J	3780J	3300J	2660J
CHROMIUM, TOTAL	55.2J	174J	58.5J	44.4J	44.3J	49.0J	51.6J	45.1J
COBALT	6.73	33.0	6.79	6.90	6.90	6.55	6.44	7.20
COPPER	29.5J	144J	87.6	99.8	124	39.3	20.3	25.3
IRON	15800J	20600J	15300J	15800J	14700J	15400J	16200J	14100J
LEAD	206J	1050J	216	201	212	257	222	139
MAGNESIUM	2960	3430	3060	2580	2450	2940	2220	2670
MANGANESE	218J	239J	155	172	166	157	171	168
MERCURY	0.149J	1.30J	0.216J	0.181J	0.283J	0.145J	0.304J	0.116J
NICKEL	30.3	130	58.2	54.1	63.6	34.8	31.2	37.7
POTASSIUM	715	874	880	846	801	937	916	882
SELENIUM	< 0.172UJ	< 0.210UJ	< 0.200UJ	< 0.205UJ	< 0.210UJ	< 0.200UJ	< 0.192UJ	< 0.209UJ
SILVER	0.740	3.50	< 0.484	0.921	< 0.465	< 0.478	< 0.431	< 0.472
SODIUM	436	417	284	310	300	324	292	300
THALLIUM	< 0.221	< 0.271	< 0.258	< 0.263	< 0.270	< 0.258	< 0.247	< 0.268
VANADIUM	27.5	45.8	28.9	29.5	27.8	34.0	30.5	28.1
ZINC	329	1590	1220J	1440J	1250J	898J	287J	1220J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-4
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	S15-15	S15-16	S15-17	Duplicate S15-17	S15-18	S15-19	S15-20	S15-21
Date Sampled	07/23/91	07/24/91	07/24/91	07/24/91	07/23/91	07/23/91	07/22/91	07/22/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	7540J	4910J	5090J	20700J	6830J	5520J	6660J	6710J
ANTIMONY	4.5	3.2	5.1	8.6	3.9	9.1	18	5.8
ARSENIC	5.23J	1.96	2.39	1.72	3.31J	3.05J	3.89J	4.30J
BARIUM	68.1J	1690J	46.2J	42.0J	99.9J	95.5J	95.8J	110J
BERYLLIUM	0.359	0.304J	< 0.132UJ	0.538J	0.435	0.625	0.966	0.394
CADMIUM	4.70	0.906	4.34	0.672	1.89	4.41	5.28	1.01
CALCIUM	4650J	6720J	3260J	29600J	14600J	3660J	2930J	3210J
CHROMIUM, TOTAL	46.3J	31.1J	37.9J	21.9J	45.5J	103J	57.4J	42.3J
COBALT	7.97	6.59	5.41	24.8	6.64	9.62	7.38	7.41
COPPER	61.9J	15.5	17.7	39.9	25.1J	36.6J	47.5J	26.0J
IRON	16000J	8610J	10600J	32400J	13300J	21000J	25400J	14200J
LEAD	186J	117	136	35.6	150J	1350J	282J	133J
MAGNESIUM	3280	2170J	2380J	10100J	3050	2580	3440	4160
MANGANESE	326J	157J	146J	647J	166J	184J	207J	218J
MERCURY	0.147J	0.121	0.084	0.711	< 0.094	< 0.098	0.308J	0.163J
NICKEL	37.5	25.2	26.5	25.8	29.0	35.2	45.4	41.1
POTASSIUM	1010	827	682	426	940	788	877	965
SELENIUM	< 0.197UJ	< 0.197UJ	< 0.201UJ	< 0.208UJ	< 0.192UJ	< 0.177UJ	< 0.194UJ	< 0.197UJ
SILVER	0.571	0.919J	0.617J	1.77J	0.980	1.09	0.803	0.645
SODIUM	400	310J	351J	2130J	410	358	302	278
THALLIUM	< 0.253	< 0.254UJ	< 0.258UJ	< 0.267UJ	< 0.247	< 0.227	< 0.250	< 0.253
VANADIUM	36.8	25.0J	26.1J	123J	29.1	27.5	34.4	29.6
ZINC	462	460	266	97.6	241	1100	1400	191

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-4
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	S15-22	S15-23	S15-24	S15-25	S15-26	S15-27	S15-28	S15-29
Date Sampled	07/22/91	07/22/91	07/23/91	07/24/91	07/23/91	07/24/91	07/24/91	07/22/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	6020J	5460J	7800J	8540J	2690J	11100J	4660J	4940J
ANTIMONY	< 2.5	< 2.5	5.2	7.5	1.9	6.2	9.8	2.8
ARSENIC	2.33	2.45	3.80J	3.56	0.824J	2.28	2.57	3.47
BARIUM	594	59.8	75.7J	63.6J	1130J	291J	69.7J	160
BERYLLIUM	< 0.130	0.358	0.582	0.351J	0.264	0.525J	0.305J	< 0.125
CADMIUM	0.634	0.559	0.986	< 0.272	0.650	< 0.315	8.17	1.47
CALCIUM	3700J	3140J	7110J	4720J	2230J	8140J	5470J	3020J
CHROMIUM, TOTAL	33.2	29.6	35.9J	33.1J	15.5J	31.8J	41.1J	36.0
COBALT	6.67	5.78	6.91	8.83	2.93	8.49	5.82	5.98
COPPER	17.9	18.8	54.5J	33.3	7.57J	18.7	27.1	17.0
IRON	11100J	9920J	16500J	16700J	4740J	13300J	12400J	10700J
LEAD	35.9	27.5	53.0J	35.8	34.9J	18.9	218	64.8
MAGNESIUM	3530	2560	4450	6460J	1050	4820J	2870J	3210
MANGANESE	227J	157J	518J	297J	65.9J	220J	209J	159J
MERCURY	< 0.100	< 0.097	0.135J	0.065	< 0.086	< 0.051	0.087	< 0.091
NICKEL	34.1	32.1	36.3	37.4	9.56	31.4	27.5	37.2
POTASSIUM	755J	796J	1100	912	492	983	635	699J
SELENIUM	< 0.210UJ	< 0.207UJ	< 0.188UJ	< 0.217UJ	< 0.177UJ	< 0.194UJ	< 0.180UJ	< 0.201UJ
SILVER	0.568	< 0.484	0.728	0.806J	0.611	0.961J	1.05J	< 0.469
SODIUM	158J	128J	332	290J	233	461J	348J	128J
THALLIUM	< 0.270	< 0.266	< 0.242	< 0.279UJ	< 0.227	< 0.249UJ	< 0.231UJ	< 0.259
VANADIUM	24.7	22.8	33.2	38.9J	11.1	35.4J	25.0J	22.3
ZINC	103	103	80.3	45.3	71.7	30.7	1420	289

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-4
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	S15-30	S15-31	S15-32	S15-33	S15-34	S15-35	S15-36	S15-37
Date Sampled	07/22/91	07/22/91	07/22/91	07/23/91	07/24/91	07/24/91	07/24/91	07/24/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	6000J	6480J	4630J	6140J	4140J	4040J	4180J	4580J
ANTIMONY	< 2.5	2.4	< 2.5	3.1	3.2	3.4	3.3	7.1
ARSENIC	3.21	5.49	2.68	2.79J	2.42	2.58	2.48	2.24
BARIUM	293	388	142	49.8J	33.3J	1920J	60.2J	59.0J
BERYLLIUM	< 0.131	0.123	0.449	0.592	0.169J	0.363J	0.132J	0.166J
CADMIUM	0.469	0.427	0.454	0.423	< 0.296	0.297	< 0.301	4.21
CALCIUM	3290J	3630J	2950J	3500J	2070J	2810J	17400J	2870J
CHROMIUM, TOTAL	37.2	35.7	28.6	37.6J	25.0J	24.7J	24.0J	29.7J
COBALT	7.15	8.13	5.90	6.61	4.92	6.89	4.61	6.40
COPPER	17.6	21.1	13.6	14.0J	8.51	8.37	10.3	16.4
IRON	11200J	12800J	8870J	11400J	7750J	7920J	7490J	11600J
LEAD	35.1	38.5	27.9	33.5J	15.2	48.2	44.7	108
MAGNESIUM	3610	4860	2950	4050	2690J	2840J	2670J	2710J
MANGANESE	185J	209J	154J	195J	133J	147J	128J	185J
MERCURY	< 0.096	< 0.097	< 0.095	0.183J	< 0.049	< 0.045	< 0.045	< 0.049
NICKEL	37.0	41.4	31.7	37.7	30.8	27.9	24.7	23.6
POTASSIUM	848J	838J	727J	816	747	634	658	777
SELENIUM	< 0.212UJ	< 0.194UJ	< 0.209UJ	< 0.202UJ	< 0.198UJ	< 0.198UJ	< 0.195UJ	< 0.184UJ
SILVER	< 0.493	0.513	< 0.480	0.300	< 0.483UJ	0.789J	0.495J	0.834J
SODIUM	173J	193J	135J	294	319J	420J	547J	305J
THALLIUM	< 0.272	< 0.249	< 0.269	< 0.259	< 0.255UJ	< 0.255UJ	< 0.251UJ	< 0.236UJ
VANADIUM	24.5	25.5	19.4	26.9	19.0J	21.9J	20.8J	25.0J
ZINC	85.7	63.6	60.1	39.6	23.9	48.1	39.8	240

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-4
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	S15-38	S15-39	S15-40	S15-41	S15-42	S15-43	S15-44	S15-45
Date Sampled	07/22/91	07/22/91	07/22/91	07/22/91	07/23/91	07/24/91	07/24/91	07/24/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	4220J	4040J	5920J	6370J	5080J	4670J	4560J	4820J
ANTIMONY	< 2.5	< 2.5	< 2.5	4.1	3.0	4.2	2.8	2.5
ARSENIC	1.76	1.72	3.60	2.08J	2.34J	1.64	1.87	1.68
BARIUM	76.0	99.1	93.5	67.4J	48.8J	39.4J	39.2J	38.0J
BERYLLIUM	0.171	0.208	< 0.129	0.562	0.300	0.491J	0.509J	0.390J
CADMIUM	0.308	< 0.300	0.446	0.496	0.302	0.475	0.365	< 0.265
CALCIUM	2530J	2170J	2780J	3500J	2790J	2680J	3310J	2830J
CHROMIUM, TOTAL	27.4	27.0	31.8	38.3J	32.5	33.3J	28.7J	29.9J
COBALT	4.76	4.60	6.33	6.36	6.03	5.48	5.59	5.75
COPPER	6.95	7.38	14.7	13.0J	11.2J	41.0	10.6	8.79
IRON	7930J	7410J	11100J	11000J	9560J	8420J	8360J	8930J
LEAD	11.2	5.52	29.8	45.2J	22.5J	12.0	17.4	35.6
MAGNESIUM	2280	2550	3690	3460	3060	2860J	3070J	2750J
MANGANESE	133J	117J	172J	174J	160J	144J	145J	151J
MERCURY	< 0.095	< 0.097	< 0.100	< 0.098	0.107J	< 0.049	< 0.052	< 0.049
NICKEL	29.1	28.0	42.1	36.3	33.5	32.8	29.0	31.2
POTASSIUM	575J	601J	818J	935	787	788	649	654
SELENIUM	< 0.208UJ	< 0.208UJ	< 0.206UJ	< 0.176UJ	< 0.187UJ	< 0.191UJ	< 0.189UJ	< 0.193UJ
SILVER	< 0.479	< 0.490	< 0.487	0.555	0.490	0.544J	0.495J	< 0.433UJ
SODIUM	94.1J	127J	133J	313	313	385J	337J	327J
THALLIUM	< 0.268	< 0.267	< 0.265	< 0.226	< 0.240	< 0.246UJ	< 0.243UJ	< 0.248UJ
VANADIUM	20.3	17.9	23.7	29.5	23.3	22.3J	21.1J	21.9J
ZINC	45.2	26.7	47.7	49.3	37.1	35.0	26.1	30.9

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-4
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	S15-46	S15-47	S15-48	S15-49	Duplicate S15-49	S15-50	S15-51	Duplicate S15-51
Date Sampled	07/24/91	07/22/91	07/22/91	07/22/91	07/22/91	07/22/91	07/23/91	07/23/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	4980J	4850J	4680J	5470J	4000J	3830J	5300J	4110J
ANTIMONY	7.1	3.8	< 2.4	< 2.4	< 2.5UJ	< 2.4	2.2	8.2
ARSENIC	2.70	6.22J	2.90	3.13	3.71J	6.98	1.87J	1.90J
BARIUM	65.7J	117J	653	2740	1350J	175	153J	283J
BERYLLIUM	0.338J	0.423	0.207	0.677	0.282	0.128	0.333	0.504
CADMIUM	11.3	1.07	0.856	0.722	0.892	< 0.290	0.835	0.665
CALCIUM	2490J	4390J	12200J	13600J	12500J	3410J	7950J	7490J
CHROMIUM, TOTAL	38.5J	34.5J	40.2	33.8	28.5J	29.2	33.8J	26.3J
COBALT	5.59	5.76	6.54	7.83	6.03	4.92	5.62	5.36
COPPER	26.0	17.9J	47.2	35.2	107	11.9	15.4J	13.9J
IRON	13200J	10100J	10300J	10800J	8540J	7480J	10300J	8520J
LEAD	219	62.3J	76.8	53.3	58.4	17.6	40.0J	45.3J
MAGNESIUM	2620J	2640	3490	3110	2880	2480	2930	2530
MANGANESE	149J	169J	204J	180J	160	145	161J	132J
MERCURY	0.111	0.221J	< 0.093	0.194	0.166J	< 0.095	< 0.095	< 0.093
NICKEL	27.2	30.9	33.8	28.1	31.7	39.1	30.2	25.1
POTASSIUM	710	724	671J	751J	568	583J	755	667
SELENIUM	< 0.193UJ	< 0.204UJ	< 0.207UJ	< 0.208UJ	< 0.210UJ	< 0.199UJ	< 0.212UJ	< 0.207UJ
SILVER	0.618J	0.620	1.18	1.08	1.74	0.480	0.702	0.617
SODIUM	339J	307	321J	460J	261	128J	469	460
THALLIUM	< 0.248UJ	< 0.262	< 0.266	< 0.267	< 0.270	< 0.256	< 0.273	< 0.266
VANADIUM	25.1J	23.7	20.4	24.5	17.5	18.0	24.3	19.8
ZINC	481	102	97.3	86.6	76.3J	34.6	51.8	47.0

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-4
NAS ALAMEDA - SITE 15
SURFACE SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	S15-52	S15-53	S15-54	Duplicate S15-54	S15-55
Date Sampled	07/24/91	07/23/91	07/23/91	07/23/91	07/24/91
Depth of Sample	0.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED					
METALS (mg/kg-dry)					
ALUMINUM	5160J	7590J	5990J	5010J	4870J
ANTIMONY	3.2J	3.6	2.7	2.7	4.8J
ARSENIC	2.77	4.50J	2.41J	2.12J	5.68
BARIUM	372J	333J	194J	290J	602J
BERYLLIUM	0.183	0.494	0.437	0.420	0.200
CADMIUM	1.16	0.453	0.282	0.299	7.64
CALCIUM	11800J	6520J	3620J	3140J	18500J
CHROMIUM, TOTAL	32.0J	63.1J	40.1J	41.8J	34.2J
COBALT	5.76	9.50	6.89	6.81	6.54
COPPER	21.0J	116J	43.1J	66.0J	56.4J
IRON	10300J	15600J	11500J	10700J	12800J
LEAD	57.2	81.5J	49.0J	26.9J	199
MAGNESIUM	3280	4990	3410	3390	2860
MANGANESE	189J	233J	151J	147J	178J
MERCURY	0.162	< 0.094	< 0.084	< 0.084	1.42
NICKEL	29.5J	47.0	33.7	32.9	28.0J
POTASSIUM	792J	927	719	626	749J
SELENIUM	< 0.204UJ	< 0.201UJ	< 0.206UJ	< 0.206UJ	< 0.211UJ
SILVER	0.724	0.468	0.444	0.307	0.520
SODIUM	629J	420	257	370	646J
THALLIUM	< 0.263	< 0.258	< 0.264	< 0.265	< 0.271
VANADIUM	21.2J	32.3	27.0	23.2	21.2J
ZINC	84.8J	96.0	47.3	55.1	722J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-5
NAS ALAMEDA - SITE 15
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B15-01-000	B15-01-002	Duplicate B15-01-002	B15-01-008	B15-01-014	B15-02-000	Redrill B15-02-000
Date Sampled	08/01/91	08/01/91	08/01/91	08/01/91	08/01/91	07/31/91	10/15/91
Depth of Sample	0.0 ft	2.0 ft	2.0 ft	8.0 ft	14.0 ft	0.0 ft	0.0 ft
PARAMETER REPORTED							
VOLATILE ORGANICS (µg/kg-dry)							
ACETONE	NA	12	13	16	14	NA	NA
METHYLENE CHLORIDE	NA	< 6.0	< 6.0	< 6.1	< 6.2	NA	NA
SEMIVOLATILE ORGANICS (µg/kg-dry)							
1,2,4-TRICHLOROBENZENE	< 100	860	< 120	< 120	< 120	< 100	NA
1,4-DICHLOROBENZENE	< 83	890	< 96	< 98	< 99	< 81	NA
2,4-DINITROTOLUENE	< 140	1100	< 170	< 170	< 170	< 140	NA
2-CHLOROPHENOL	< 140	1800	< 170	< 170	< 170	< 140	NA
2-METHYLNAPHTHALENE	< 100	< 120	< 120	< 120	< 120	< 100	NA
4-CHLORO-3-METHYLPHENOL	< 140	1800	< 170	< 170	< 170	< 140	NA
4-NITROPHENOL	< 520	2000	< 600	< 610	< 620	< 500	NA
ACENAPHTHENE	< 83	1000	< 96	< 98	< 99	< 81	NA
BENZO(B)FLUORANTHENE	160	< 120	< 120	< 120	< 120	< 100	NA
BIS(2-ETHYLHEXYL)PHTHALATE	< 100	< 120	< 120	520	< 120	300	NA
CHRYSENE	< 100	< 120	< 120	< 120	< 120	150	NA
FLUORANTHENE	160	< 96	< 96	< 98	< 99	250	NA
N-NITROSODI-N-PROPYLAMINE	< 100	870	< 120	< 120	< 120	< 100	NA
PHENANTHRENE	< 83	< 96	< 96	< 98	< 99	< 81	NA
PHENOL	< 140	1800	< 170	< 170	< 170	< 140	NA
PYRENE	170	880	< 96	< 98	< 99	170	NA
PESTICIDES/PCBS/HERBICIDES (µg/kg-dry)							
Aroclor-1260	2700	< 40	< 40	< 41	< 41	6400	6400

Notes: NA = Not analyzed
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.

TABLE 14-5
NAS ALAMEDA - SITE 15
SOIL ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	B15-02-002	B15-02-008	B15-02-014	B15-03-000	B15-03-002	B15-03-008	B15-03-014
Date Sampled	07/31/91	07/31/91	07/31/91	07/31/91	07/31/91	07/31/91	07/31/91
Depth of Sample	2.0 ft	8.0 ft	14.0 ft	0.0 ft	2.0 ft	8.0 ft	14.0 ft
PARAMETER REPORTED							
VOLATILE ORGANICS (µg/kg-dry)							
ACETONE	24	38	< 14	NA	< 11	19	36
METHYLENE CHLORIDE	5.9	< 6.2	< 6.8	NA	< 5.3	6.4	7.1
SEMIVOLATILE ORGANICS (µg/kg-dry)							
1,2,4-TRICHLOROBENZENE	< 110	< 120	< 140	< 110	< 110	< 120	< 130
1,4-DICHLOROBENZENE	< 90	< 99	< 110	< 84	< 85	< 96	< 100
2,4-DINITROTOLUENE	< 160	< 170	< 190	< 150	< 150	< 170	< 180
2-CHLOROPHENOL	< 160	< 170	< 190	< 150	< 150	< 170	< 180
2-METHYLNAPHTHALENE	< 110	< 120	< 140	240	< 110	< 120	< 130
4-CHLORO-3-METHYLPHENOL	< 160	< 170	< 190	< 150	< 150	< 170	< 180
4-NITROPHENOL	< 560	< 620	< 680	< 530	< 530	< 600	< 640
ACENAPHTHENE	< 90	< 99	< 110	< 84	< 85	< 96	< 100
BENZO(B)FLUORANTHENE	< 110	< 120	< 140	< 110	< 110	< 120	< 130
BIS(2-ETHYLHEXYL)PHTHALATE	< 110	< 120	< 140	< 110	< 110	< 120	< 130
CHRYSENE	< 110	< 120	< 140	< 110	< 110	< 120	< 130
FLUORANTHENE	< 90	< 99	< 110	< 84	< 85	< 96	< 100
N-NITROSODI-N-PROPYLAMINE	< 110	< 120	< 140	< 110	< 110	< 120	< 130
PHENANTHRENE	< 90	< 99	< 110	230	< 85	< 96	< 100
PHENOL	< 160	< 170	< 190	< 150	< 150	< 170	< 180
PYRENE	< 90	< 99	< 110	100	< 85	< 96	< 100
PESTICIDES/PCBS/HERBICIDES (µg/kg-dry)							
Aroclor-1260	< 38	< 41	< 45	< 350	< 35	< 40	< 43

Notes: NA = Not analyzed
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.

TABLE 14-6
NAS ALAMEDA - SITE 15
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B15-01-000	B15-01-002	Duplicate B15-01-002	B15-01-008	B15-01-014	B15-02-000	B15-02-002	B15-02-008
Date Sampled	08/01/91	08/01/91	08/01/91	08/01/91	08/01/91	07/31/91	07/31/91	07/31/91
Depth of Sample	0.0 ft	2.0 ft	2.0 ft	8.0 ft	14.0 ft	0.0 ft	2.0 ft	8.0 ft
PARAMETER REPORTED								
METALS (mg/kg-dry)								
ALUMINUM	9530J	9710J	3760J	3310J	5370J	6500J	7850J	3100J
ANTIMONY	4.6	2.7	< 2.7	< 2.6	3.6	6.0J	4.4J	< 2.9UJ
ARSENIC	7.31J	1.65J	2.09J	1.63J	1.44J	2.70	7.54	1.48
BARIUM	106	71.0	49.9	51.5	36.8	50.9J	89.5J	31.4J
BERYLLIUM	1.05	1.03	0.346	0.292	0.912	0.328	0.523	0.327
CADMIUM	0.568	< 0.319	< 0.325	< 0.306	< 0.332	1.52	< 0.283	< 0.353
CALCIUM	18900J	2650J	1970J	3170J	3430J	3400J	2480J	1130J
CHROMIUM, TOTAL	38.2J	70.1J	28.6J	24.7J	33.1J	42.7	29.5	18.3
COBALT	7.99	8.07	4.29	3.69	5.69	6.61	6.93	3.25
COPPER	34.9	6.44	3.26	3.08	6.51	25.6	11.3	2.89
IRON	17200J	13700J	6880J	6070J	9410J	11700J	11200J	5050J
LEAD	192	3.05J	4.17J	1.68J	1.78J	59.1J	5.51J	1.79J
MAGNESIUM	5440	2590	1490	1580	2600	3190J	2960J	1200J
MANGANESE	326J	108J	63.3J	68.7J	89.4J	168J	192J	63.2J
MERCURY	0.188	< 0.058	< 0.060	< 0.060	< 0.054	0.068	< 0.051	< 0.058
NICKEL	36.8	54.0	23.0	20.9	30.3	36.5J	22.7J	13.4J
POTASSIUM	1070	1120	560	512	818	833	903	616
SELENIUM	< 0.170UJ	< 0.227UJ	< 0.222UJ	< 0.220UJ	< 0.222UJ	< 0.205UJ	< 0.235UJ	< 0.253UJ
SILVER	0.524	< 0.522	< 0.530	< 0.500	< 0.542	0.882	0.762	0.726
SODIUM	948	371	313	826	1580	274	832	524
THALLIUM	< 0.218	< 0.292	< 0.285	< 0.282	< 0.286	< 0.264	< 0.302	< 0.325
VANADIUM	33.7	32.1	19.5	17.5	23.2	30.3	31.2	13.5
ZINC	119	20.9	12.0	11.9	20.5	135J	32.3J	10.2J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-6
NAS ALAMEDA - SITE 15
SOIL ANALYTICAL RESULTS FOR METALS

Sample Number	B15-02-014	B15-03-000	B15-03-002	B15-03-008	B15-03-014
Date Sampled	07/31/91	07/31/91	07/31/91	07/31/91	07/31/91
Depth of Sample	14.0 ft	0.0 ft	2.0 ft	8.0 ft	14.0 ft
PARAMETER REPORTED					
METALS (mg/kg-dry)					
ALUMINUM	13400J	12400J	7870J	14100J	8660J
ANTIMONY	5.9J	6.8J	3.7J	6.0J	4.1J
ARSENIC	5.15	5.76	2.58	2.33	3.78
BARIUM	23.2J	281J	80.4J	107J	136J
BERYLLIUM	0.407	0.712	0.316	0.894	0.392
CADMIUM	< 0.392	0.329	< 0.314	< 0.321	< 0.350
CALCIUM	32900J	7190J	3510J	3220J	3260J
CHROMIUM, TOTAL	44.7	61.5	33.0	53.8	35.3
COBALT	9.17	15.0	6.19	10.9	7.29
COPPER	12.5	38.8	9.32	13.1	7.58
IRON	17800J	21600J	10800J	17900J	11800J
LEAD	5.83J	44.2J	6.32J	6.81J	7.42J
MAGNESIUM	7000J	11200J	2980J	3770J	2930J
MANGANESE	171J	354J	146J	148J	100.0J
MERCURY	< 0.065	0.099	< 0.048	0.058	< 0.056
NICKEL	40.5J	89.8J	26.9J	52.5J	32.6J
POTASSIUM	2400	1350	1070	1810	1390
SELENIUM	< 0.275UJ	< 0.215UJ	< 0.218UJ	< 0.245UJ	< 0.266UJ
SILVER	1.01	0.511	< 0.513	0.587	< 0.571
SODIUM	3720	476	374	445	1260
THALLIUM	< 0.353	< 0.276	< 0.280	< 0.314	< 0.342
VANADIUM	38.1	39.5	27.6	43.3	29.1
ZINC	40.2J	56.6J	20.8J	34.9J	23.9J

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-7
NAS ALAMEDA - SITE 15
GROUNDWATER ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS

Sample Number	M15-01	Duplicate M15-01	M15-02	M15-03
Date Sampled	**09/04/91**	**09/04/91**	**09/04/91**	**09/04/91**
PARAMETER REPORTED				
VOLATILE ORGANICS (µg/L)	ND	ND	ND	NDR
SEMIVOLATILE ORGANICS (µg/L)	ND	ND	ND	ND
PESTICIDES/PCBS (µg/L)				
ALDRIN	<0.050UJ	NA	<0.050UJ	<0.050UJ
TOTAL PETRO. HYDROCARBONS (mg/L)	ND	ND	ND	ND

Notes: NA = Not Analyzed
ND = Not detected
UJ = Qualifed, estimated not detected
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-8
NAS ALAMEDA - SITE 15
GROUNDWATER ANALYTICAL RESULTS FOR METALS

Sample Number	M15-01	M15-02	M15-03
Date Sampled	09/04/91	09/04/91	09/04/91
PARAMETER REPORTED			
METALS (µg/L)			
ALUMINUM	< 31.0	34.0	< 31.0
ANTIMONY	< 25.1	< 25.1	< 25.1
ARSENIC	3.3	< 7.8	3.5
BARIUM	315	253	153
BERYLLIUM	< 1.3	< 1.3	< 1.3
CADMIUM	< 3.0	< 3.0	< 3.0
CALCIUM	193000J	301000J	54100J
CHROMIUM,TOTAL	< 5.7	< 5.7	< 5.7
COBALT	< 6.1	< 6.1	< 6.1
COPPER	2.7	< 2.1	< 2.1
IRON	8.2UJ	79.6J	14.7UJ
LEAD	< 2.0UJ	< 6.0UJ	< 2.0UJ
MAGNESIUM	149000	647000	51300
MANGANESE	740	1130	172
MERCURY	< 0.2	< 0.2	< 0.2
NICKEL	< 13.2	< 13.2	< 13.2
POTASSIUM	84500	180000	41600
SELENIUM	< 2.1UJ	< 6.3UJ	< 2.1UJ
SILVER	< 4.9	5.1	< 4.9
SODIUM	1390000J	5640000J	670000J
THALLIUM	< 13.5UJ	< 13.5UJ	< 2.7UJ
VANADIUM	12.0	< 4.2	4.7
ZINC	< 2.3	< 2.3	4.8UJ

Notes: J = Qualified, estimate
UJ = Qualifed, estimated not detected
< = Analyte reported below detection limit
TOTAL = Includes trivalent and hexavalent chromium
Rationale and justification for data qualification are presented in the Phases 2B and 3 QCSR.

TABLE 14-9
NAS ALAMEDA - SITE 15
GROUNDWATER ANALYTICAL RESULTS FOR GENERAL CHEMICALS

Sample Number	M15-01	M15-01DUP	M15-02	M15-03
Date Sampled	09/04/91	09/04/91	09/04/91	09/04/91
PARAMETER REPORTED				
PHYSICAL PARAMETERS-LAB				
ALKALINITY, BICA (mg/L-CaC03)	71.0	NA	27.0	77.0
ALKALINITY, CARB (mg/L-CaC03)	< 5.0	NA	< 5.0	< 5.0
ALKALINITY, NC/OH (mg/L-CaCO3)	< 5.0	NA	< 5.0	< 5.0
ALKALINITY, PHENOLPH (mg/L)	< 5.0	NA	< 5.0	< 5.0
ALKALINITY, T. (mg/L-CaCO3)	71.0J	NA	27.0J	77.0J
HARDNESS (mg/L-CaCO3)	1230	NA	6500	372
TOTAL DISSOLVED SOLIDS (mg/L)	5080J	NA	19400J	2050J
PHYSICAL PARAMETERS-FIELD				
pH, FIELD (Std. Units)	7.00	7.00	7.00	7.00
SP. COND., FIELD @25C (µmhos/cm)	12000	12000	28000	6000
WATER TEMP (C)	21.0	21.0	21.0	NA
TOTAL ORGANIC CARBON (mg/L)				
CARBON, TOC	7.9J	NA	28.5J	6.4J
ANIONS (mg/L)				
CHLORIDE	2707J	NA	11090J	1043J
FLUORIDE	0.30J	NA	0.30J	0.70J
NITROG, NO2 + NO3	0.434	NA	0.039	0.085
SULFATE	282.5J	NA	1537J	44.18J

Note: NA = Not analyzed
J = Qualified, estimated value
< = Analyte reported below detection limit
Shaded areas highlight detections above the detection limit.

15.0 BASEWIDE GROUNDWATER OCCURRENCE

15.1 EXPECTED OCCURRENCE

Groundwater in coastal areas generally occurs as freshwater in inland areas with a zone of mixing along the coast where the freshwater meets salt water. At NAS Alameda, freshwater was identified in the vicinity of a few of the sites. Shallow groundwater in all other portions of the base investigated is classified as brackish or saline (Section 2.0).

Regional groundwater flow in the East Bay Plain reportedly flows from highlands east of the island out toward the San Francisco Bay (ACFCWCD, 1988). In a simplistic model for Alameda Island, groundwater would recharge through unpaved portions of the surface at NAS Alameda and flow through the subsurface, radially outward toward the boundaries of the island. This simplistic scenario may be complicated by the presence of preferential flow paths, low permeability zones inhibiting flow, and/or tidal influences on the perimeter of the island that may affect gradients and flow directions.

Preferential flow pathways for groundwater are likely to exist at NAS Alameda. Fill placed on the tidal flats and in shallow portions of the Bay in the 1940s to create the island used hydraulic methods. These methods result in some sorting by grain size. Review of historic aerial photos indicates the hydraulic discharge pipes were moved in a series of east-west linear rows. This could result in some degree of preferential flow pathways along the rows. A more significant type of feature that could affect flow pathways are deep utility trenches. Any trenches that intercept the upper water-bearing zone, and that are backfilled with material more permeable than the surrounding soils, will act as conduits.

The utility trenches, which extend to the bay, exist below the water table and are backfilled with relatively coarser soils. Tidal action may extend inland and affect water table gradients along trenches and surrounding areas. The possible occurrences of tidal influences on groundwater along utility trenches and along the perimeter of the island will make interpretation of basewide groundwater flow patterns and gradients difficult.

15.2 OBSERVED OCCURRENCE

Groundwater in the shallow aquifer is first encountered at approximately 3 to 5 feet below ground surface throughout most of the base. Tidal influences on the shallow groundwater occur along the northern boundary of NAS Alameda, adjacent to the Oakland Inner Channel, in portions of the base immediately north and east of the Sea Plane Lagoon, and adjacent to a drainage along Main Street, which

is filled with water during high tides. A tidal influence study planned for the affected sites will aid in evaluating tidal effects on shallow groundwater flow.

A contour map of groundwater elevations in the shallow water-bearing zone is included as Figure 15-1. Measurements were taken on December 5, 1991, between 10:10 a.m. and 10:50 a.m., when the tide was at approximately the maximum high for the day. Data collection occurred within a 40-minute span to minimize changes in groundwater elevation due to tidal activity. While the tidal cycle was nearing the maximum high, measurements collected in the wells may not reflect the maximum amount of tidal influence due to the lag time between tidal activity in the Bay and influence in the wells. As shown on Figure 15-1, the groundwater elevations vary significantly throughout the area investigated. The variation may be related to heterogeneities in the fill material, the close proximity of monitoring wells to utility trenches with permeable backfill material or tidal influences.

The draft final version of this report will incorporate the results of a tidal influence study performed at Phases 2B and 3 sites determined to be affected tidal fluctuations. Analysis of the tidal influence study data will provide information on groundwater flowpaths and gradients at different times during a daily diurnal tidal cycle. Data will also be used to determine the average hydraulic head in each well.

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

BASEWIDE GROUNDWATER CONTOUR MAP
DECEMBER 5, 1991

FIGURE 15-1

A-6

M-05-01 4.18
M-05-05 3.40
M-05-02 5.18
M-05-03 3.95
M-05-03 6.72
Site 5 Bldg. 5
SECOND STREET
THIRD STREET
AVENUE C
M-08-03 4.55
M-08-04 4.68
M-08-02 4.35
M-08-05 4.72
Site 8 Bldg. 114
AVENUE D
M-08-01 4.66
M-12-01 2.13
M-12-02 3.00
Site 12 Bldg. 10
M-12-03 3.80
M-12-04 3.92
AVENUE F
M-10-01 6.57
Site 10A Bldg. 400
M-10-02 6.03
M-10-03 6.58
M-06-05 5.89
M-06-04 6.69
Site 6 Bldg. 41
M-06-02 6.15
M-06-02 6.10
M-06-03 6.13
MIRAMAR ROAD
NORFORK
GLEN VIEW
M-07A-04
W-01
W-02
M-07A-01
B3 (W3)
Site 7A Bldg. 459
M-07A-02
M-07A-03
AVENUE G
AVENUE H
ATLANTIC AVENUE
M-7B-01 7.00
WA-8 5.37
Site 7B Bldg. 162
AVENUE I
M-11-01 4.86
M-11-02 5.14
Site 11 Bldg. 14
M-11-08 5.02
M-11-04 5.32
EIGHTH STREET
M-04-01 6.77
M-04-04 7.30
Site 4 Bldg. 360
M-04-02 7.31
M-04-03 7.50

SEAPLANE LAGOON

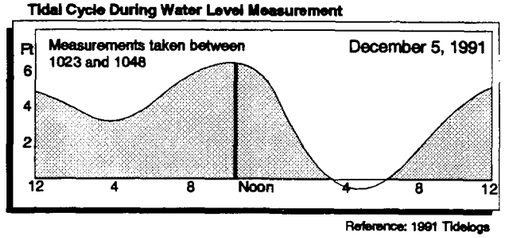
LEGEND:

- Monitoring Well Location
- 6.03 Groundwater elevation (feet above mean low low water)
- Monitoring Well Location Installed by Other Consultant
- Groundwater Contour
- 66 Structure
- Site
- Railroad
- Fence

Notes:
1) Monitoring Well locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27
2) Base map CAD File provided by NAS Alameda

0 150 300
SCALE IN FEET

Tidal Cycle During Water Level Measurement



Reference: 1991 Tidelogs

16.0 BASEWIDE OCCURRENCE OF POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL

A distinctive suite of polycyclic aromatic hydrocarbons (PAH) was frequently observed in soil sample analytical results from sites throughout NAS Alameda, although the entire suite was not observed at all sites. The overall suite of compounds detected is presented in Table 16-1. The specific compounds and concentrations found at each site are listed in the data tables found in the site specific chapters. The overall and site-specific occurrences of the PAH suite are discussed later in this section.

16.1 CHARACTERISTICS OF POLYCYCLIC AROMATIC HYDROCARBONS

Polycyclic aromatic hydrocarbons are a class of organic compounds consisting of two or more benzene rings fused or superimposed together in such a way that each pair of rings shares two carbon atoms (Streitwieser and Heathcock, 1981). PAH have high molecular weights, low solubility in water, high organic partition coefficients (K_{OC}), and high octanol/water partition coefficients (K_{OW}). Several are known or suspected human carcinogens. Table 16-1 presents the molecular weight, solubility in water, organic and octanol/water partition coefficients, and the current carcinogenicity classification of the PAH compounds detected in soils at NAS Alameda.

PAH compounds generally have high octanol/water partition coefficients (K_{OW}). K_{OW} is a general indicator of the extent to which a compound will partition into organic matter from an aqueous environment. For example, compounds with high K_{OW} tend to be better bioaccumulators than compounds that have low coefficients. PAH may then bioaccumulate in the food chain and reach higher-order receptors such as humans. This bioaccumulation may only occur when the compounds are available for consumption by the lower-order organisms. For example, bioaccumulation would not occur in any area where the compound of concern is strongly sorbed to subsurface soil, thus preventing migration to an area where biological receptors could be able to take up the compound into the food chain.

Six of the PAH listed in Table 16-1 have a current carcinogenicity classification. Benzo(a)anthracene, benzo(b)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene, and ideno(1,2,3-cd)pyrene are classified "B2" carcinogens by the EPA. B2 carcinogens are probable human carcinogens with adequate animal evidence, but have inadequate or lacking human evidence.

TABLE 16-1

CHARACTERISTICS OF POLYCYCLIC AROMATIC HYDROCARBONS FOUND AT NAS, ALAMEDA

	Molecular Weight (g/mole)	Water Solubility (mg/l)	K_{OC}	Log K_{OW}	Carcinogenicity Classification
2-Methylnaphthalene	–	–	–	–	
Acenaphthene	154	3.42E00	4600	4.00	
Acenaphthylene	152	3.93E00	2500	3.70	
Anthracene	178	4.50E-02	14000	4.45	
Benzo(a)anthracene	228	5.70E-03	1380000	5.60	B2
Benzo(a)pyrene	252	1.20E-03	5500000	6.06	B2
Benzo(b)fluoranthene	252	1.40E-02	550000	6.06	B2
Benzo(g,h,i)perylene	276	7.00E-04	1600000	6.51	
Benzo(k)fluoranthene	252	4.30E-03	550000	6.06	
Chrysene	228	1.80E-03	200000	5.61	B2
Dibenzo(a,h)anthracene	278	5.00E-04	3300000	6.80	B2
Fluoranthene	202	2.06E-01	38000	4.90	
Fluorene	116	1.69E00	7300	4.20	
Indeno(1,2,3-cd)pyrene	276	5.30E-04	1600000	6.50	B2
Naphthalene	–	–	–	–	
Phenanthrene	178	1.00E00	14000	4.46	
Pyrene	202	1.32E-01	38000	4.88	

Notes:

K_{OC} = organic partition coefficient

K_{OW} = octanol/water partition coefficient

-- = Information not available.

Source for molecular weight, solubiltiy in water, K_{OC}, and K_{OW} information is USEPA Superfund Public Health Evaluation Manual, October 1986, NTIS No. PB87-183125.

Source for carcinogenicty information is USEPA Health Effects Assessment Summary Tables, Annual FY 1991, NTIS No. PB91-921199.

B2 carcinogens are probable human carcinogens with sufficient animal evidence, but inadequate or lacking human evidence. Compounds that have a blank in this column are not classified as carcinogens.

16.2 MOBILITY OF POLYCYCLIC AROMATIC HYDROCARBONS AT NAS ALAMEDA

The solubility in water and the K_{OC} are two important determining factors in the mobility of a compound in soil systems where groundwater is the primary solvent. Solubility is the maximum concentration of a compound that can be dissolved in water. Compounds with low solubilities, such as the PAH found at NAS Alameda, tend to separate from, or not dissolve in, water.

The organic partition coefficient is a measurement of how strongly a compound will be sorbed by soil and/or partition into water. A high K_{OC} indicates that a compound is strongly sorbed by soil organic matter. Compounds with K_{OC} values greater than 2,000 are generally immobile in soil that has sufficient total organic carbon (TOC) (Dragun, 1988). K_{OC} values for the PAH compounds detected at NAS Alameda are in the range of 2,500 to 5,500,000. TOC results from soil samples at NAS Alameda (Appendix C) are between 0.1% and 4%, depending on the site. The PAH compounds found at NAS Alameda have a combination of low solubility in water and high K_{OC}, indicating that they will strongly partition into the soil and should not be found in the groundwater.

When bulk hydrocarbons (gasoline, TCE, etc.) are the primary solvent instead of water, the partitioning and mobility of relatively water-insoluble organic compounds may be altered. However, undiluted bulk hydrocarbons (i.e. free product) were not encountered at the NAS Alameda sites discussed in this report. Therefore, this transport mechanism is not considered important.

16.3 DISTRIBUTION OF POLYCYCLIC AROMATIC HYDROCARBONS AT NAS ALAMEDA

Some or all of the members of the PAH suite were found in soil at every site investigated for this study. The lateral and vertical distributions of PAH vary by site but, with the exception of Site 15, are generally concentrated at the interface between the native sediments and the overlying fill materials. PAH at Site 15 appear to be concentrated on the surface. The distribution of PAH at each site is discussed below. To illustrate the vertical distribution of PAH compounds within soils, a plot of the total PAH versus sample depth is presented for each site.

When studying the plots, several points are important. First, the data tables presented in previous sections of this report were used to calculate the total PAH values. The tables report all compounds that were detected in at least one sample at each site. The list of PAH compounds at a site may be long due to detections in only a single sample. This would produce a similarly long list of non-detected values in the tables for samples that do not contain the PAH compounds.

Total PAH values were estimated by summing the actual detected values plus a portion of the non-detected values of PAH. For purposes of summing the PAH suite, non-detected values are represented by the detection limit value divided by the square root of two (Hornung and Reed, 1990). It is important to understand that if a large suite occurs at a site, a sample that had no reported PAH detections could still have total PAH as high as 1,400 µg/kg when the detection limits are summed in the manner described above. Therefore, the lowest values represented on the plots are more a reflection of the summation of the non-detected values than the actual lowest level detected. A sample with a total PAH sum equal to or less than the detection limit sum does not necessarily contain PAH. A list of the PAH found at the site, along with an indication of the approximate total of the summation of non-detected values, is included at the bottom of each plot for reference.

Second, because the number of PAH compounds detected at each site varied, the summation for total individual sample values (particularly those with a large list of non-detected values) is not comparable to the summation from another site that had fewer detected compounds.

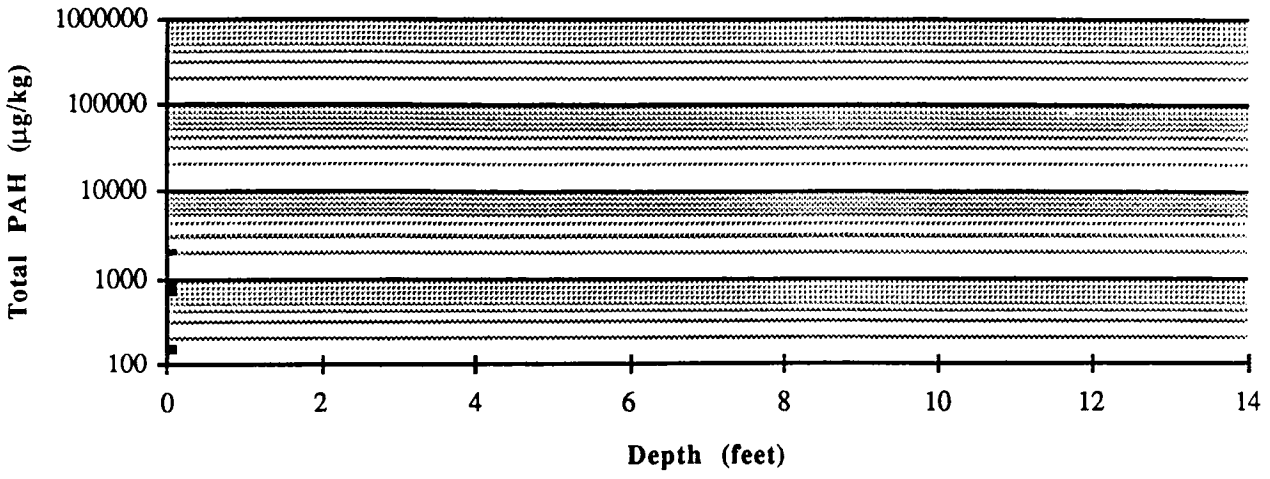
Third, the detection limits of members of the PAH suite vary from sample to sample and between sites. The variation is generally due to matrix interference or dilutions required due to high concentrations of other compounds. Varying detection limits that could cause confusion are discussed below.

16.3.1 Site 4

Two PAH compounds were detected in the surface soil under the Site 4 plating shop (Figure 16-1). Only surface soil samples were taken at this site, so there is no current information on the vertical distribution of PAH.

16.3.2 Site 5

Sixteen PAH compounds were detected in the soil samples at Site 5 (Figure 16-2). The sum of the detection limits divided by the square root of two is approximately 1,100 µg/kg. Samples with total PAH sums of 1,100 µg/kg or less do not necessarily represent detected PAH. The plot of Site 5 soil samples indicates that the highest total PAH concentrations were detected in samples collected at 14 and 15 feet below grade. Only four samples shallower than 14 feet below grade have total PAH concentrations above 1,100 µg/kg.



The plot is based on the two PAH detected at Site 4. The sum of the detection limits divided by the square root of two is between 130 µg/kg to 700 µg/kg depending on matrix interference. Samples which plot in this range or below do not necessarily indicate detected PAH. No subsurface samples were collected at this site.

The detected PAH compounds at Site 4 are:

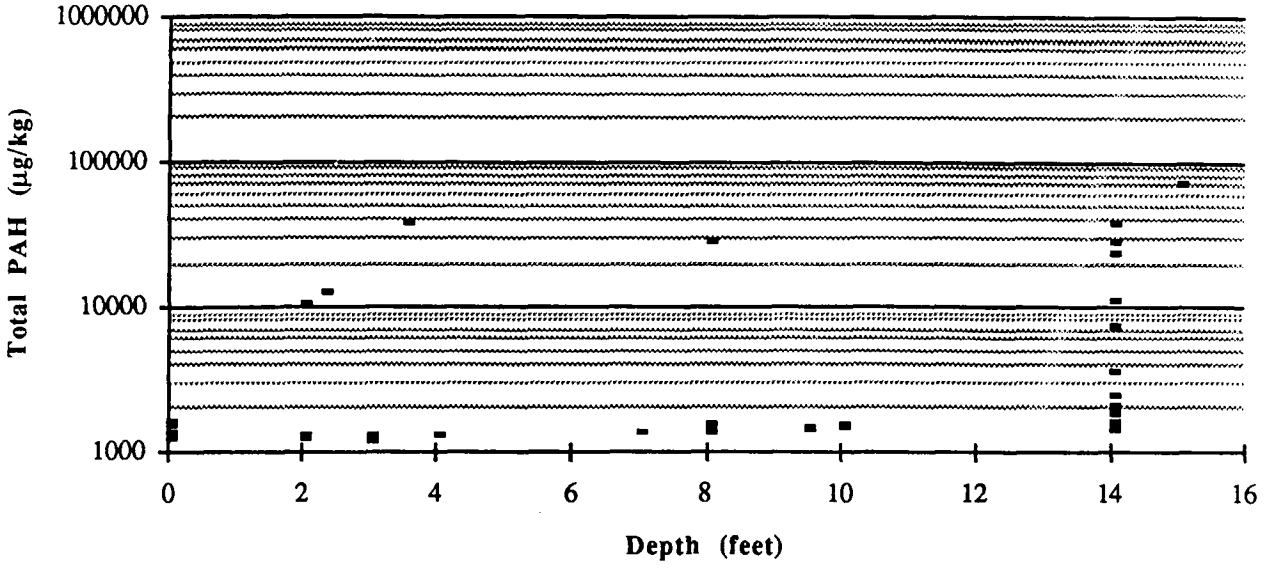
Chrysene
Fluoranthene

LEGEND

– Soil Sample

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 4
CONCENTRATION OF TOTAL POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL

FIGURE 16-1



The plot is based on the 16 PAH detected at Site 5. The sum of the detection limits divided by the square root of two is approximately 1100 µg/kg. Samples with a total of 1100 µg/kg or less on the plot do not necessarily indicate detected PAH.

The detected PAH compounds at Site 5 are:

2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenzo(a,h)anthracene
Fluoranthene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

LEGEND

– Soil Sample

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 5
CONCENTRATION OF TOTAL POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL
FIGURE 16-2

16.3.3 Site 6

Fifteen PAH compounds were detected in the soil samples at Site 6 (Figure 16-3). The sum of the detection limits divided by the square root of two for the 15 PAH compounds varies between approximately 1,100 and 1,400 µg/kg. Several samples at 8 and 14 feet below grade have total PAH values greater than the sum of the detection limits. One sample on at 2, 6, and 11 feet also have PAH values greater than detection limits.

16.3.4 Site 7A

The sum of the detection limits divided by the square root of two for the 15 PAH compounds detected in the soil at Site 7A varies between approximately 1,100 and 1,400 µg/kg (Figure 16-4). The distribution of PAH greater than the detection limit is concentrated in samples collected from between 7 feet deep and the surface.

16.3.5 Site 7B

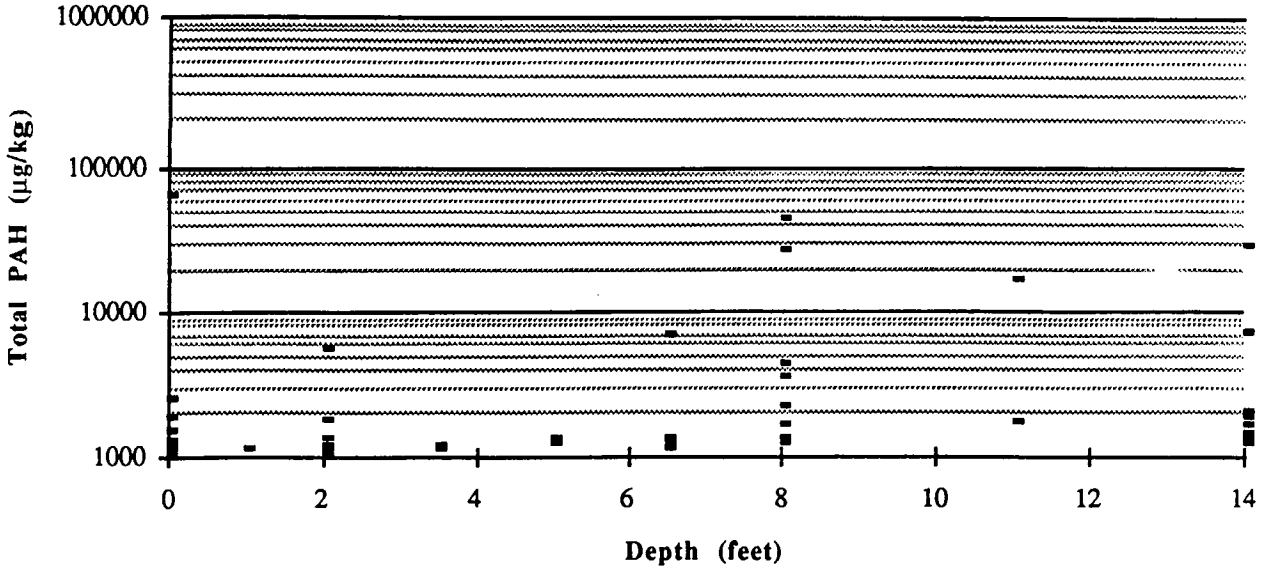
The sum of the detection limits divided by the square root of two for the 12 PAH compounds detected in the soil at Site 7B varies between approximately 900 and 1,050 µg/kg (Figure 16-5). The samples with total PAH concentrations greater than than 1,050 µg/kg are found at a depth of 11 feet below grade.

16.3.6 Site 8

Seventeen PAH compounds were detected in Site 8 soil samples. The sum of the detection limits divided by the square root of two for these compounds varies between approximately 1,300 and 1,500 µg/kg, for most samples (Figure 16-6). Due to matrix interference, five surface samples have total detection limits divided by the square root of two between 6,000 and 13,000 µg/kg. Excluding those five samples, the samples with total PAH greater than 1,500 µg/kg are found almost exclusively at 14 feet below grade. A single sample from 12 feet below grade had a total PAH concentration of 7,700 µg/kg.

16.3.7 Site 10A

The sum of the detection limits divided by the square root of two for the six PAH compounds detected in the soil at Site 10A varies between approximately 500 and 700 µg/kg (Figure 16-7). The only samples with total PAH concentrations greater than 700 µg/kg are found at 14 feet. The maximum total PAH concentration detected at Site 10A it 1,100 µg/kg.



The plot is based on the 15 PAH detected at Site 6. The sum of the detection limits divided by the square root of two is between 1100 and 1400 µg/kg. Samples with total of 1400 µg/kg or less on this plot do not necessarily indicate detected PAH.

The detected PAH compounds at Site 6 are:

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

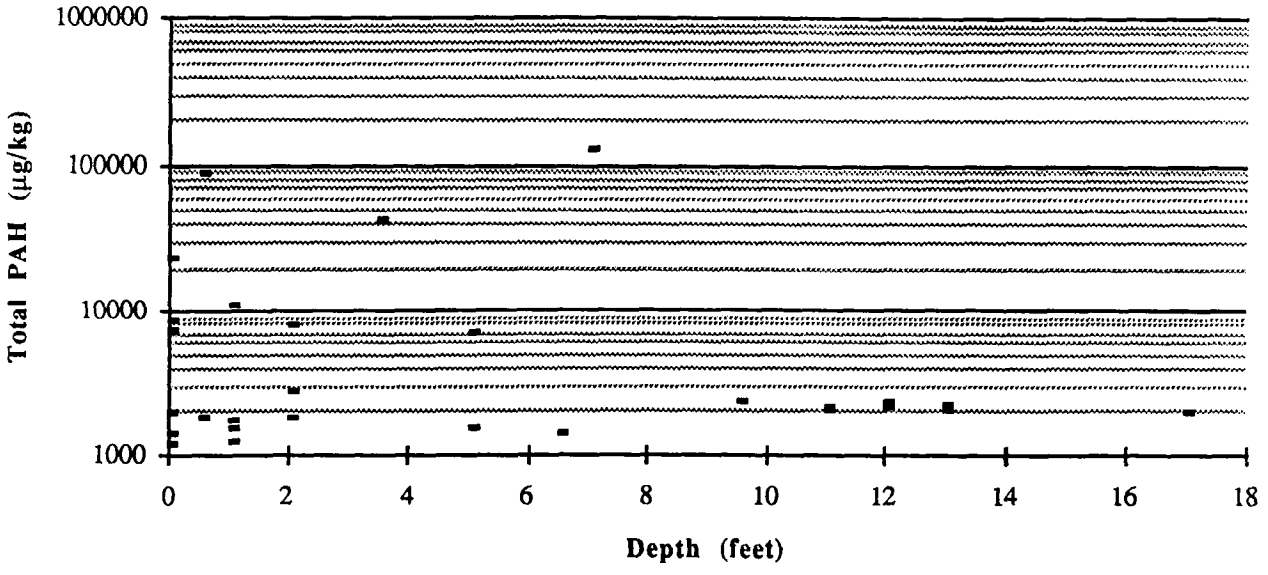
LEGEND

– Soil Sample

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

SITE 6
CONCENTRATION OF TOTAL POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL

FIGURE 16-3



The plot is based on the 15 PAH detected at Site 7A. The sum of detection limits divided by the square root of two is approximately 1100 µg/kg. Samples with totals of 1100 µg/kg or less on the plot does not necessarily indicate detected PAH.

The detected PAH compounds at Site 7A are:

2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Fluoranthene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

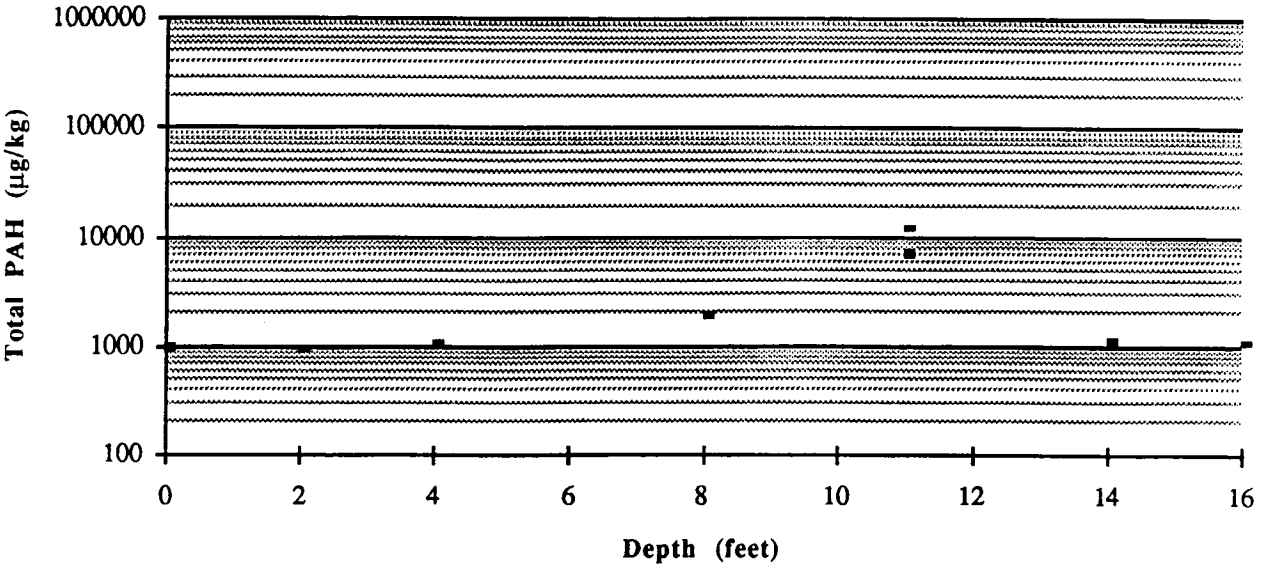
LEGEND

– Soil Sample

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

SITE 7A
CONCENTRATION OF TOTAL POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL

FIGURE 16-4



The plot is based on the 12 PAH detected at Site 7B. The sum of the detection limits divided by the square root of two is between 950 and 1050 µg/kg. Samples with totals equal to1050 µg/kg or less on the plot do not necessarily indicate detected PAH.

The detected PAH compounds at Site 7B are:

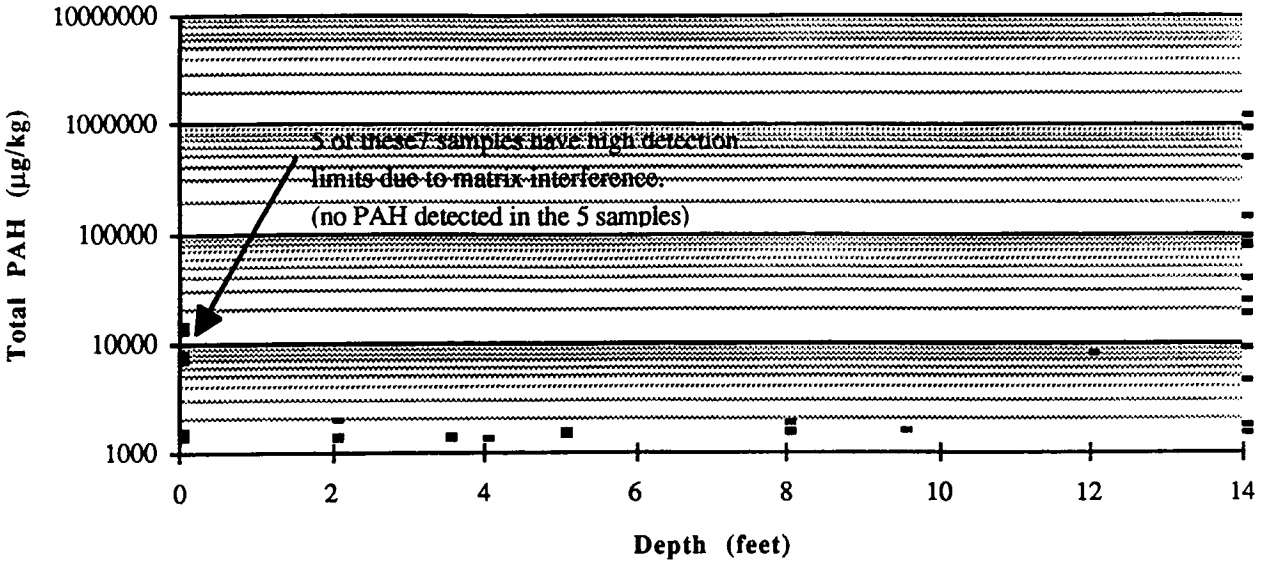
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Fluoranthene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

LEGEND

– Soil Sample

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 7B
CONCENTRATION OF TOTAL POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL

FIGURE 16-5



The plot is based on the 17 PAH detected at Site 8. The sum of the detection limits divided by the square root of two is between 1300 and 1500 µg/kg, for most samples. Gernerally, samples below 1500 µg/kg on the plot do not necessarily indicate detected PAH. Five of the surface samples have very high detection limits due to matrix interference. These are pointed out on the plot.

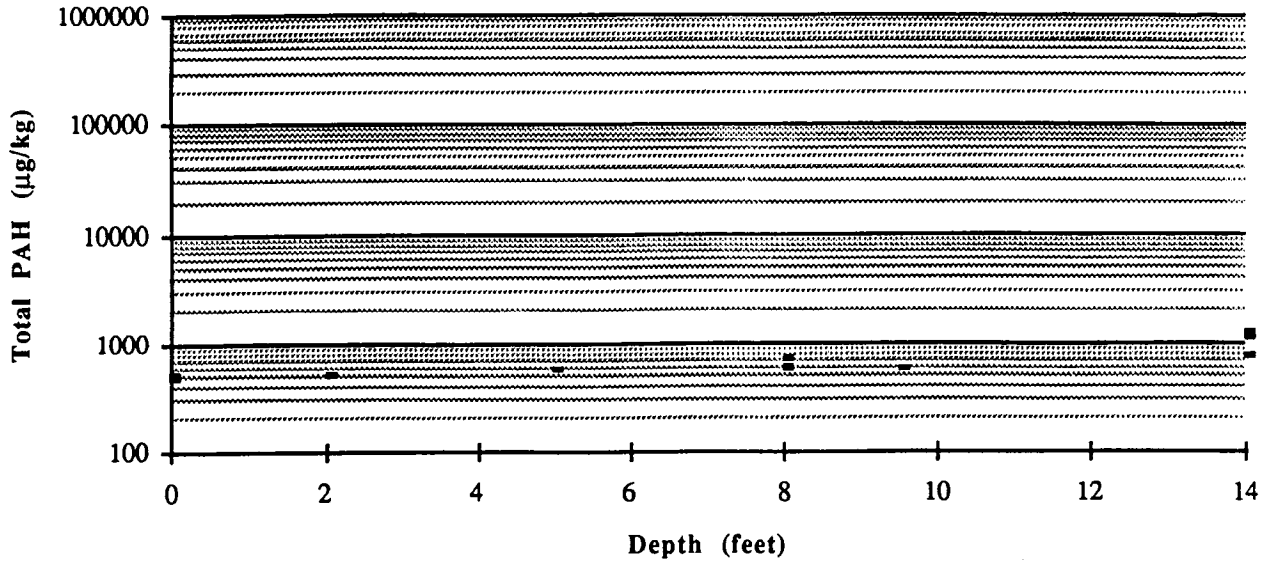
The detected PAH compounds at Site 8 are:

2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenzo(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

LEGEND

– Soil Sample

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 8
CONCENTRATION OF TOTAL POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL
FIGURE 16-6



This plot is based on six PAH. The sum of the detection limits is between 500 and 700 µg/kg. Sample with total PAH concentrations of 700 µg/kg or less do not neccesarily indicate that PAH was detected.

The PAH detected at Site 10A are:

Benzo(a)pyrene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Fluoranthene
Pyrene

LEGEND

– Soil Sample

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

SITE 10A
CONCENTRATION OF TOTAL POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL

FIGURE 16-7

16.3.8 Site 11

Fourteen PAH compounds were detected in Site 11 soil samples. The sum of the detection limits divided by the square root of two for these compounds varies between approximately 1,000 and 1,200 µg/kg (Figure 16-8). Two samples from between 9 and 10 feet in depth, one sample from 5 feet and one sample from a depth of 14 feet have total PAH concentrations greater than 1,200 µg/kg.

16.3.9 Site 12

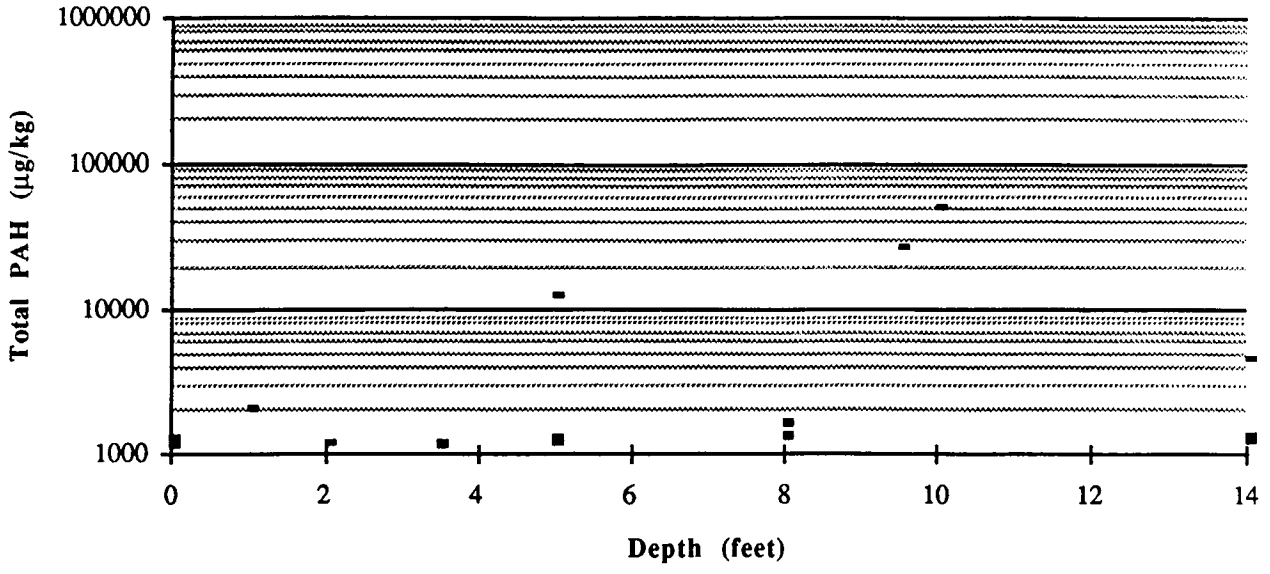
The sum of the detection limits divided by the square root of two for the 15 PAH detected in the soil at Site 12 is between 1,150 and 1,385 µg/kg for most of the samples (Figure 16-9). Four surface samples and one sample from 3.5 feet had high detection limits due to matrix interference. These samples are flagged on the data plot. With one exception, all of the samples with total PAH concentration exceeding the normal detection limits are found at 9.5 feet and deeper. A high proportion of these samples is found at 14 feet. The exception to this pattern is the surface sample from boring B-12-10, which has a total PAH concentration of 11,000 µg/kg. As with all samples, the total PAH concentration for the surface sample from boring B12-10 includes the detection limits divided by the square root of two for the non-detected values in the suite.

16.3.10 Site 14

The sum of the detection limits divided by the square root of two for the four PAH detected in the soil at Site 14 is between 200 and 300 µg/kg for most of the samples (Figure 16-10). The samples from the 5 foot depth have higher detection limits due to matrix interference and their sums are between 400 and 500 µg/kg. The only samples with PAH above the detection limit totals are two surface samples and one sample from 2 feet.

16.3.11 Site 15

The sum of the detection limits divided by the square root of two for the 14 PAH detected in the soil at Site 15 is between 950 and 1100 µg/kg (Figure 16-11). The only samples with PAH above the detection limit totals are a number of surface samples and one sample from 2 feet below the surface.



The plot is based on the 14 PAH detected at Site 11. The sum of the detection limits divided by the sqare root of two is between 1000 and 1200 µg/kg. Samples with total PAH of 1200 µg/kg or less on the plot do not necessarily indicate detected PAH.

The detected PAH compounds at Site 11 are:

2-Methylnaphthalene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenzo(a,h)anthracene
Fluoranthene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

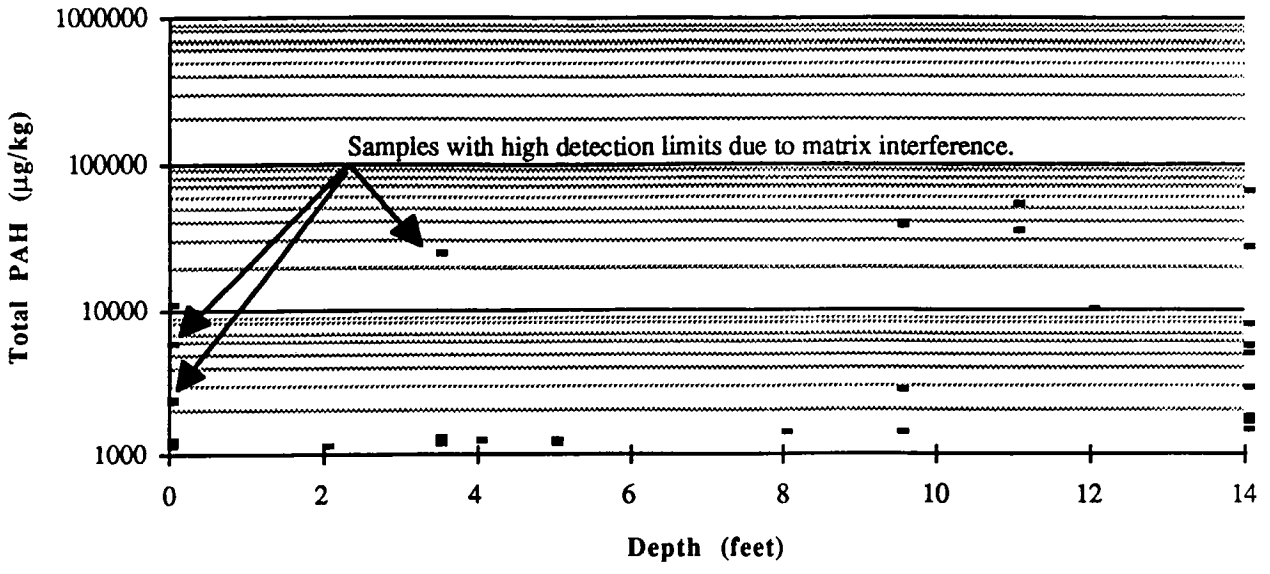
LEGEND

– Soil Sample

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

SITE 11
CONCENTRATION OF TOTAL POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL

FIGURE 16-8



The plot is based on the 15 PAH detected at Site 12. The sum of the detection limits divided by the square root of two for most of the samples is between 1100 and 1300 µg/kg. Generally, samples below 1300 µg/kg do not necessarily indicate detected PAH. Four of the surface samples and one sample at a depth of 3.5 feet have high detection limits due to matrix interference. These samples are pointed out on the plot (because of multiple samples with the same sum the four surface samples appear to be only two on the plot).

The detected PAH compounds at Site 12 are:

2-Methylnaphthalene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Diben(a,h)anthracene
Fluoranthene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

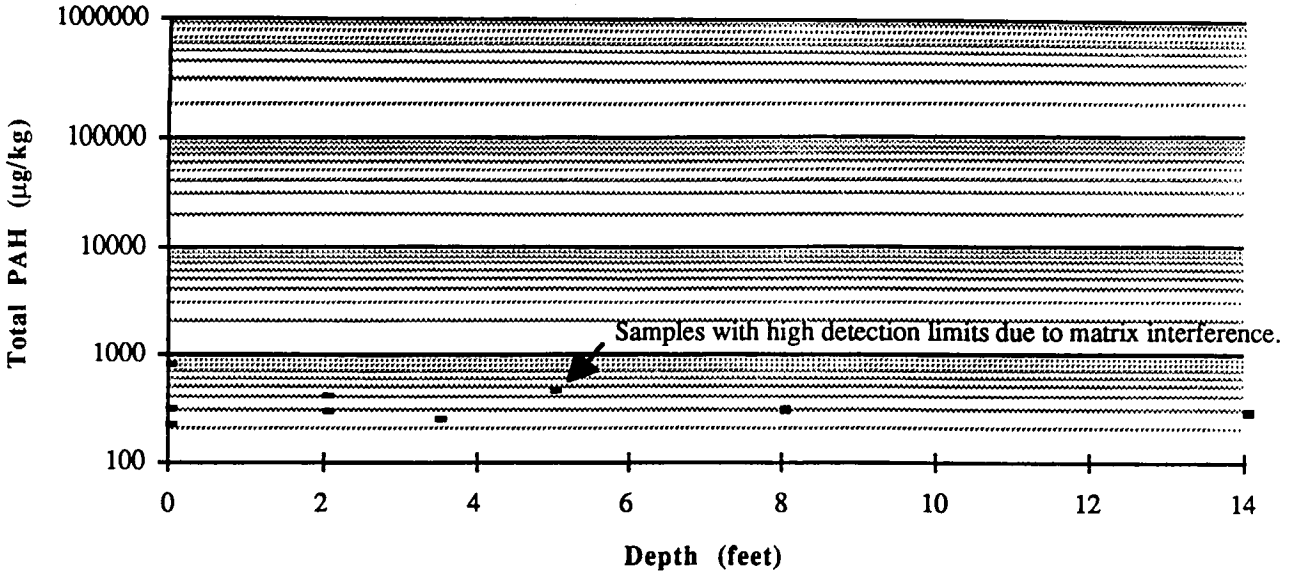
LEGEND

– Soil Sample

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

SITE 12
CONCENTRATION OF TOTAL POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL

FIGURE 16-9



The sum of the detection limits divided by the square root of two for the four PAH detected in the soil at Site 14 is between 200 and 300 µg/kg for most of the samples. The samples from the five foot depth have higher detection limits due to matrix interference and their sums are between 400 and 500 µg/kg. The only samples with PAH above the detection limit totals are two surface samples and one sample from two feet.

The detected PAH compounds at Site 14 are:

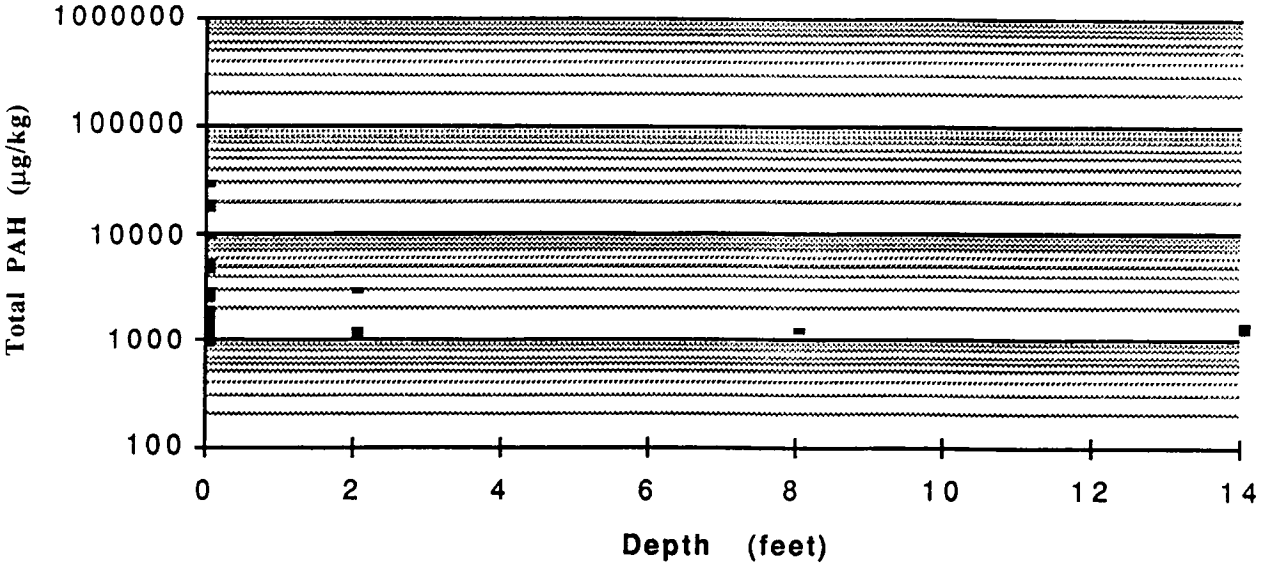
Chrysene
Fluoranthene
Phenanthrene
Pyrene

LEGEND

– Soil Sample

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 14
CONCENTRATION OF TOTAL POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL

FIGURE 16-10



The sum of the detection limits divided by the square root of two is between 950 and 1100 µg/kg. Samples below 1150 µg/kg on this plot do not necessarily indicate detected PAH.

The detected PAH compounds in soil at Site 15 are:

2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(K)fluoranthene
Chrysene
Fluoranthene
Ideno(1,2,3-cd)pyrene
Phenanthrene
Pyrene

LEGEND

– Soil Sample

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SITE 15
CONCENTRATION OF TOTAL POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL

FIGURE 16-11

16.4 PROBABLE ORIGIN OF POLYCYCLIC AROMATIC HYDROCARBONS AT NAS ALAMEDA

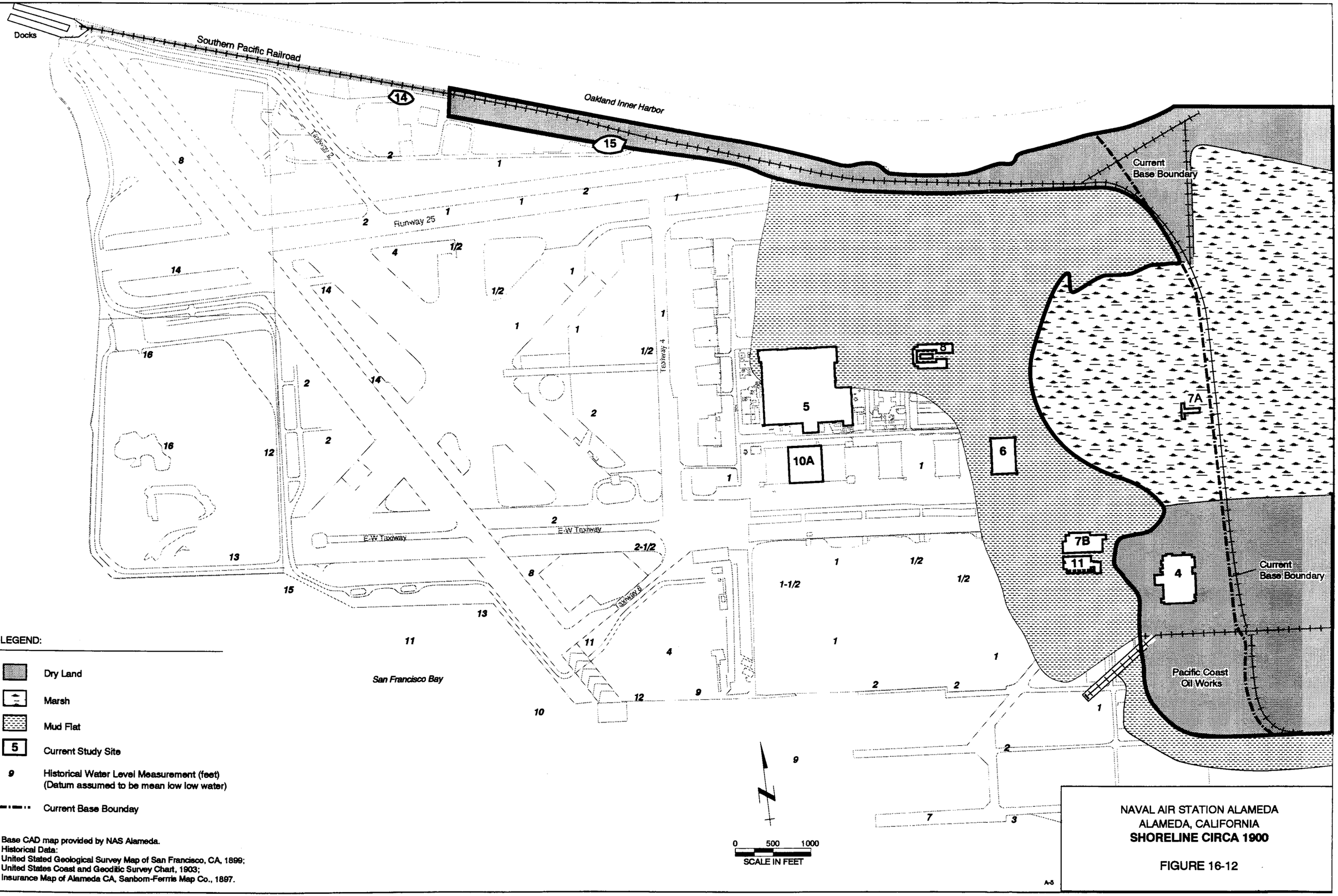
Polycyclic aromatic hydrocarbons are generally regarded as byproducts from combustion or pyrolysis processes or associated with petroleum processing or products. Between 1879 and 1903, the Pacific Coast Oil Works occupied the area shown on Figure 16-12 (Canonie, 1990a; Sanborn, 1897). Petroleum refining processes of that era consisted of distilling the crude oil and condensing the distillates in long horizontal condensing boxes. The primary products would have been kerosene and fuel oil, with gasoline and other "light" (short carbon chain) products only as byproducts. Catalytic cracking methods to break down the long chain hydrocarbons and large PAH molecules were not yet invented. An 1897 Sanborn Insurance Map for the Pacific Coast Oil Works shows eight "tar stills" and seven other unspecified stills. Twenty above-ground iron "oil tanks" are also illustrated on the map. It is not known what wastes were generated by the oil works or where they were disposed. Given the technology of the time and length of time the plant was in operation, it is reasonable to assume that some PAH-laden sludges or wastes may have entered the surrounding Bay either through dumping or runoff during rains.

As seen on Figure 16-12, most of what is now NAS Alameda was either marsh or tidal flat during the time the Pacific Coast Oil Works was in operation. The depth of the water over the study sites, as indicated by navigational charts of the era, is summarized below:

Site	Water Depth
4	Dry land
5	0.5 - 1 foot
6	Tidal Flat
7A	Marsh
7B	Tidal Flat
8	Tidal Flat
10A	0.5 - 1 foot
11	Tidal Flat
12	0.5 - 1 foot
14	1 - 2 feet
15	Dry land between 1884 and 1903

Source: US Coast and Geodetic Survey Charts, 1884 and 1903

All water depths listed above reflect depths at low tide. Tidal flats are assumed to be exposed during low tide. The top of the borings drilled for this investigation were surveyed relative to the mean low



LEGEND:

- Dry Land
- Marsh
- Mud Flat
- 5 — Current Study Site
- 9 — Historical Water Level Measurement (feet) (Datum assumed to be mean low low water)
- Current Base Bounday

Base CAD map provided by NAS Alameda.
Historical Data:
United Stated Geological Survey Map of San Francisco, CA, 1899;
United States Coast and Geoditic Survey Chart, 1903;
Insurance Map of Alameda CA, Sanborn-Ferris Map Co., 1897.

0 500 1000
SCALE IN FEET

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
SHORELINE CIRCA 1900

FIGURE 16-12

low water datum. When the historic soundings (depth of Bay floor beneath low water) are added to the elevation of the borings (elevation of the ground surface above low water) the resulting number should approximate the depth in the boring that corresponds with the historic Bay floor. For purposes of this report, low tide for the charts is assumed to equal the mean low low water datum used for surveying.

The results of the elevation comparison and typical depths to concentrated zones of PAH are presented below for the sites that were underwater at the time the oil works was in operation.

	Top of Boring (feet above MLLW)	Historic Water Depth (feet below MLLW)	Depth of Historic Bay Floor Beneath Current Ground Surface	Approximate Depth of Highest Concentration of PAH in Borings
Site 5	12.18	0.75	12.9	14 - 15
Site 6	11.34	0.5	11.8	8 - 14
Site 7B	11.66	0.5	12.2	11
Site 8	11.29	0.5	11.8	12 - 14
Site 10A	11.33	1	12.3	14
Site 11	11.87	0.5	12.4	9.5 - 11
Site 12	11.55	0.5	12.0	9.5 14
Site 14	10.84	2.0	12.8	0

Sites 4 and 15 were dry land at the time the Pacific Coast Oil Works was in operation. Only surface data is available for Site 4, so the PAH distribution with depth is unknown. The highest concentration of PAH at Site 15 is in the surface samples.

The location of Site 7A lies within an area occupied by a marsh during the time the oil works were operating. Typical marshes consist of low-lying areas that are periodically inundated with water. Small channels sometimes occur within the marsh that can shift periodically. The highest PAH concentrations at Site 7A were encountered from 0.5 to 6.5 feet. This may reflect deposition on the irregular, channeled surface of the marsh.

The presence of PAH in some areas of NAS Alameda could be explained by these materials being contained in, or deposited on, native sediments in the general vicinity of the oil works and tidal flats. The sporadic occurrence of PAH in subsurface soil samples from the surface to the depth of the fill/native sediment interface may be explained by the PAH being present in some of the materials used for the fill.

Support for this explanation is found in aerial photographs from 1939 showing dredging and fill operations. Notably, one aerial photograph shows apparent dredging adjacent to an area where the refinery was located. Therefore, many of the PAH detected are believed to have originated from the old oil works, either directly through deposition on the former Bay floor/tidal flat surface, or by the deposition of fill that contained PAH. However, PAH found in surface soils from known burn areas, such as the fire fighting training area (Site 14), may be associated with NAS Alameda operations.

17.0 PUBLIC HEALTH AND ENVIRONMENTAL EVALUATION

Canonie developed a Public Health and Environmental Evaluation (PHEE) plan as part of the work plan for NAS Alameda (Canonie, 1990a). The PHEE plan addresses 20 sites and contains what Canonie described as a preliminary PHEE that was performed using information from a review of site history and industrial activities and operations. The preliminary PHEE used some chemical data obtained in the historical review, but the data were sometimes of uncertain application because they were from limited investigations. While the preliminary PHEE was then exhaustive in considering potential worker, visitor, resident, and ecological exposure pathways, it also concluded that "no data exist to quantitatively evaluate potential human health risks that may be posed by contaminants at NAS Alameda." This preliminary PHEE was used, in part, to develop the Canonie RI/FS sampling plan, which was used as the basis for planning and conducting the work presented in this report.

The preliminary PHEE by Canonie followed EPA guidance applicable in 1989, which was "Superfund Public Health Evaluation Manual (SPHEM), October 1986," and Chapter 5, "Evaluate Protection of Public Health Requirements" from Guidance on Feasibility Studies under CERCLA, June, 1985. While the principles applied in developing the preliminary PHEE are largely the same as current guidance, some of the specific approaches and data used are not in accordance with current guidance and knowledge.

The discussion presented here expands upon and updates the preliminary PHEE prepared by Canonie. The discussion consists of a preliminary pathway analysis based upon the conceptual site model described in Section 2.0. This preliminary pathway analysis is intended to identify exposure pathways which have the most likely potential for being complete. A comprehensive risk assessment will further address these issues in the Remedial Investigation.

17.1 POTENTIAL RECEPTORS

Three potential receptors have been identified for this evaluation. These are humans, terrestrial organisms, and marine organisms. Freshwater organisms are not considered potential receptors for this evaluation because there is no fresh surface water near any of the sites in this study. Freshwater receptors may be included in the risk assessment portion of the NAS Alameda comprehensive RI because parts of the base with fresh surface water will be addressed in that report.

17.1.1 Human Receptors

Human receptors include workers and visitors to the base. For purposes of this preliminary evaluation, all human receptors are grouped together and no specific exposure scenarios are identified. Special receptor groups and exposure scenarios will be identified and fully discussed in the risk assessment portion of the comprehensive RI.

17.1.2 Terrestrial Organisms

Terrestrial organisms include all plants and non-aquatic animals found at NAS Alameda. For purposes of this preliminary evaluation, special categories of organisms, such as endangered species, have not been identified. Identification of special populations and exposure scenarios will be performed during the risk assessment portion of the comprehensive RI.

17.1.3 Marine Organisms

Marine organisms include the benthic biota inhabiting the bay and estuaries surrounding Alameda Island. Human consumption of benthic organisms as a secondary exposure route, is not considered in this preliminary evaluation because the part of San Francisco Bay near NAS Alameda has been closed to harvesting of benthic organisms for many years. This secondary exposure route may be addressed during the risk assessment portion of the Comprehensive RI.

17.2 POTENTIAL EXPOSURE PATHWAYS

Seven potential exposure pathways have been identified for this evaluation. Five of the pathways apply to human and terrestrial organism receptors. Two of the pathways apply to marine organism receptors. Table 17-1 illustrates which potential exposure pathways are complete for the receptors identified above. The individual pathways are discussed below. In the absence of exposure scenarios and fate and transport analysis, only the possibility of exposure to the receptors via each pathway is assessed in this preliminary evaluation. The likelihood of exposure will be assessed in the risk assessment portion of the comprehensive RI.

17.2.1 Human and Terrestrial Organism Receptors

The five potential exposure pathways identified for human and terrestrial organism receptors are drinking water, soil and dust ingestion, inhalation of dust, inhalation of vapors, and dermal contact.

TABLE 17 - 1

POTENTIAL PATHWAYS ANALYSIS

Site	Human and Terrestrial Organism Receptors					Marine Organism Receptors	
	Drinking Water	Soil Ingestion	Inhalation of Dust	Inhalation of Vapors	Dermal Contact	Ingestion*	Dermal Contact*
Site 4 - Plating Shop	I	C	C	I	C	C	C
Site 5 - Aircraft Rework	I	I	I	I	I	C	C
Site 6 - Aircraft Maintenance	I	I	I	I	I	C	C
Site 7A - Fuel Station	I	I	I	I	I	C	C
Site 7B - Former Fuel Station	I	I	I	I	I	C	C
Site 8 - Pesticides Storage	I	C	C	I	C	C	C
Site 10A - Missile Rework	I	I	I	I	I	C	C
Site 11 - Engine Testing	I	I	I	I	I	C	C
Site 12 - Power Plant	I	I	I	I	I	C	C
Site 14 - Fire Training Area	I	C	C	I	C	C	C
Site 15 - Transformer Storage	I	C	C	I	C	C	C

I = Pathway Incomplete

C = Pathway Complete

* = Pathway tentatively complete pending fate and transport analysis

17.2.1.1 Drinking Water. No human drinking water is currently derived from surface or groundwater at NAS Alameda. Currently, all human drinking water is supplied by the East Bay Municipal Utility District. It is not likely that drinking water will be derived from surface or groundwater at NAS Alameda in the future because, as discussed in Section 2.0, the shallowest aquifer is subject to salt water intrusion and naturally occurring elevated nitrate concentrations; the deeper aquifers are subject to naturally occurring mercury contamination. No terrestrial organisms use the groundwater for drinking water and there is no surface water at any of the sites. For these reasons, the drinking water pathway is considered incomplete for human and terrestrial organism receptors at all of the sites studied for this project.

17.2.1.2 Soil and Dust Ingestion. Inadvertent ingestion of surface soil or dust by humans or terrestrial organisms may occur when soil and dust are exposed and available to the receptors. In order for this exposure pathway to be complete, the site must be unpaved so that the soil is exposed. Currently, only Sites 14, 15, and a portion of Site 8 are unpaved. The soil ingestion pathway is considered complete for both humans and terrestrial organisms at all of Sites 14 and 15 and the unpaved portion of Site 8.

The interior of the Site 4 (Building 360) plating shop contains dust that could be inadvertently ingested by humans working in or visiting the building. Therefore, the pathway is considered complete for humans. It is unlikely that terrestrial organisms can enter the plating shop, so the pathway is considered incomplete for them.

17.2.1.3 Inhalation of Dust. Fugitive dust is dust that can be blown about a site so that it is made available for human or terrestrial organisms to inhale it. Most sites are covered with pavement so dust cannot escape and the inhalation of dust exposure pathway is considered incomplete. As with the soil and dust ingestion pathway, the dust inhalation pathway is complete for both humans and terrestrial organisms at Sites 14 and 15, and the unpaved portion of Site 8. The pathway is considered complete for humans in the Site 4 plating shop.

17.2.1.4 Inhalation of Vapors. Contaminants can volatilize, releasing vapors that are available for human or terrestrial organism receptors for inhalation. This only occurs when the compounds are in contact with the atmosphere and have sufficiently high vapor pressures to volatilize. This pathway is considered incomplete at all of the study sites for two reasons. First, all of the sites except Sites 14 and 15, and part of Site 8 are paved, thus preventing atmospheric contact. Second, compounds with sufficiently high vapor pressures to volatilize under normal atmospheric conditions were not encountered at the unpaved sites.

17.2.1.5 Dermal Contact. Human and terrestrial organism receptors may inadvertently come into contact with contaminated media when the media are exposed. The same constraints about exposure of the contaminated media for dust inhalation and soil and dust ingestion apply to dermal contact. Therefore, like these other pathways, the dermal contact pathway is considered complete for both humans and terrestrial organisms at Sites 14 and 15, and the unpaved portions of Site 8. The pathway is considered complete for humans in the Site 4 plating shop.

17.2.2.

~~17.3.2~~ **Marine Organism Receptors**

The two potential exposure pathways identified for marine organism receptors are ingestion and dermal contact.

17.2.2.1

~~17.3.2.1~~ **Ingestion.** Marine benthic organisms may ingest contaminated groundwater in the event that it reaches the Bay and estuary that surrounds NAS Alameda. In the absence of fate and transport analyses, it has been assumed that groundwater from all of the sites may reach the Bay and estuary. The pathway is therefore considered complete for all sites.

Detailed fate and transport analysis will be conducted during the comprehensive RI stage of work at NAS Alameda. After that analysis, the marine organism ingestion exposure pathway may be shown to be incomplete for some or all of the current study sites.

17.2.2.2 Dermal Contact. As with the marine organism ingestion exposure pathway, the marine organism dermal contact exposure pathway has been assumed to be complete for all sites until detailed fate and transport analyses are performed.

18.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Applicable or relevant and appropriate requirements (ARARs) are used to determine the appropriate extent of site cleanup, develop site-specific remedial response objectives, develop remedial action alternatives, and direct site cleanup. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Contingency Plan (NCP), requires that hazardous waste site remedial actions, including those at federal facilities, comply with federal ARARs. SARA also requires attainment of state ARARs if they are more stringent than federal ARARs, legally enforceable, and consistently enforced statewide.

18.1 APPLICABILITY OF REGULATORY REQUIREMENTS AT FEDERAL FACILITIES

Section 120 of CERCLA provides guidance for the remediation of hazardous constituents released from federal facilities. CERCLA requires that each department, agency, and instrumentality of the United States government, including executive, legislative, and judicial branches of the government, be subject to and comply with CERCLA. Under Executive Order 12580 - Superfund Implementation, the President of the United States delegated to the Secretary of Defense the responsibility of responding to releases or threats of releases of hazardous contaminants from any facility or vessel under jurisdiction of the Department of Defense (DOD). Section 2701 of SARA - the Environmental Restoration Program authorizes the Secretary of Defense to carry out a program of environmental restoration at facilities under its jurisdiction. DOD environmental restoration activities must be carried out in a manner consistent with Section 120 of CERCLA.

18.2 DEFINITION AND DEVELOPMENT OF ARARs

An ARAR may be either applicable or relevant and appropriate, but not both. According to the NCP, "applicable" and "relevant and appropriate" are defined as follows:

- Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under state or federal environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and are more stringent than federal requirements may be applicable.

- Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under state or federal environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

Requirements that are applicable or relevant and appropriate must be met by CERCLA remedial actions; other types of standards or guidance information fall into the "to be considered" (TBC) category. TBCs are federal and state advisories or guidance that are not legally binding and do not have the status of potential ARARs. However, if there are no specific ARARs for a chemical or site condition, or if existing ARARs are not deemed sufficiently protective, then guidance or advisory criteria should be identified and used to ensure public health and environmental protection.

Section 121(d)(4) of CERCLA identifies the following six circumstances under which ARARs may be waived. An ARAR may only be waived for on-site remedial actions.

- The remedial action selected is only a part of a total remedial action (interim remedy) and the final remedy will attain the ARAR upon its completion.

- Compliance with the ARAR will result in a greater risk to human health and the environment than alternative options.

- Compliance with the ARAR is technically impracticable from an engineering perspective.

- An alternative remedial action will attain an equivalent standard of performance through the use of another method or approach.

- The ARAR is a state requirement that the state has not consistently applied (or demonstrated the intent to apply consistently) in similar circumstances.

- For Section 104 Superfund-financed remedial actions, compliance with the ARAR will not provide a balance between protecting human health and the environment and the availability of Superfund money for response at other facilities.

18.3 ARARs DEVELOPMENT

Identification of ARARs must be done on a site-specific basis. Neither SARA nor the NCP provide across-the-board standards for establishing specific cleanup goals at a particular site. Rather, the process recognizes that each site will have unique characteristics that must be evaluated and compared to those requirements that apply under the given circumstances. Described below are the three different types of requirements that CERCLA actions may have to comply with : chemical-specific, location-specific, and action-specific. A discussion of these requirements as they apply to NAS Alameda is presented in Section 18.4.

18.3.1 Chemical-Specific ARARs

Chemical-specific ARARs are usually health- or risk-based numerical values or methodologies which represent acceptable concentrations of chemicals that may be found in, or discharged to, the ambient environment. If a chemical has more than one ARAR, the most stringent ARAR generally should be complied with. Both ARARs and TBCs should be subject to a site-specific risk assessment to ensure exposure levels are within acceptable limits for the protection of human health and other environmental receptors. In some cases, such as multiple exposure pathways or multiple contaminants, a risk assessment may indicate that an ARAR alone is not sufficiently protective and TBCs, including risk-based limits, will be used to establish cleanup requirements.

18.3.2 Location-Specific ARARs

Location-specific ARARs are restrictions placed on the concentration of hazardous substances or restrictions on the conduct of activities solely because the sites are in specific types of locations. Some examples of special locations include floodplains, wetlands, historic places, and sensitive ecosystems or habitats.

18.3.3 Action-Specific ARARs

Action-specific ARARs are requirements or limitations on specific potential remedial actions. The type and nature of these requirements are dependent upon the particular remedial or removal action taken at a site, and thus different actions or technologies are often subject to different action-specific ARARs. An example would be the restriction against exhausting off-gases from an air stripper due to air-quality requirements.

18.4 IDENTIFICATION OF CHEMICAL-SPECIFIC AND LOCATION-SPECIFIC ARARs

For the Phases 2B and 3 investigation at NAS Alameda, potential chemical-specific ARARs and TBCs for groundwater have been identified by reviewing the EPA draft guidance document, CERCLA Compliance with Other Laws Manual, and state-specific regulations and criteria (EPA, 1988). Chemical-specific ARARs identified here are preliminary and will be subject to review by the DTSC. Action-specific requirements will be identified when remedial alternatives are developed in the feasibility study that will be performed as Phase 8. Location-specific ARARs will be determined as part of the Phase 7 Comprehensive RI planned for NAS Alameda.

The following paragraphs describe the specific ARARs that apply to this investigation.

Maximum Contaminant Levels (MCLs) established for drinking water by EPA under the Safe Drinking Water Act (40 CFR Part 141) are applicable requirements when water will or would be used as a drinking water source for a community supply of 25 or more people, or 15 or more service connections. MCLs and non-zero Maximum Contaminant Level Goals (MCLGs) are relevant and appropriate requirements in other cases where surface water or groundwater is or may be directly used for drinking water, in which case the MCLs or MCLGs should be met in the surface water or groundwater itself. Due to the brackish and saline nature of the shallow groundwater at NAS Alameda, and the known groundwater quality problems related to nitrates and salt water intrusion in the East Bay Plain area, the shallow groundwater is not considered a suitable potential drinking water source. Groundwater within deeper aquifers is no longer used due to naturally-occurring mercury (E&E, 1983). Thus, MCLs are not considered applicable chemical-specific ARARs.

The California Regional Water Quality Control Board (RWQCB), San Francisco Bay Region, has designated the groundwater basin in which Alameda Island lies for potential use as "domestic or municipal supply, industrial process supply, industrial service supply, and agricultural supply" (RWQCB, 1986). However, the RWQCB indicates that "local groundwater quality conditions may vary significantly, due to natural factors, making some groundwater supplies unsuitable for the uses indicated." Due to the brackish and saline nature of the shallow groundwater at NAS Alameda, and the known groundwater quality problems related to nitrates and salt water intrusion in the East Bay Plain area, the shallow groundwater is not considered a suitable potential drinking water source. Groundwater within deeper aquifers is no longer used due to naturally-occurring mercury (E&E, 1983). Thus, water quality goals identified by the RWQCB for basins designated potential agricultural or municipal water supply are not considered applicable chemical-specific ARARs.

Applied Action Levels (AALs) are developed according to procedures outlined in The California Site Mitigation Decision Tree Manual (DHS, 1986). These values are based on maximum acceptable exposure of biological receptors to substances associated with hazardous waste sites and facilities. Thus, AALs are derived by considering human health effects without dealing with technical feasibility, economic concerns, or other factors. Since AALs are entirely health-based, they are different on both a criterion and use basis from standards developed by other agencies (e.g., water quality criteria developed by EPA), and are therefore TBCs for NAS Alameda. AALs are summarized in Appendix H and are not referenced in the following chapters discussing site-specific analytical results.

The EPA has established water quality criteria (WQC) for the protection of marine aquatic life (EPA, 1986). Acute and/or chronic criteria have been established for selected organic and inorganic compounds. Federal WQC are summarized in Table 18-1. Due to the proximity of the site to the San Francisco Bay, and the apparent discharge of shallow groundwater to the Bay (Section 16.0), Federal WQC are considered potential chemical-specific ARARs for shallow groundwater at NAS Alameda.

TABLE 18-1

ALAMEDA NAS
POTENTIAL CHEMICAL-SPECIFIC ARARS
(Sheet 1 of 2)

	Marine Acute Criteria (µg/L)[a]	Marine Chronic Criteria (µg/L)[a]
Organic Compounds		
Acenaphthene	970	710
Acrolein	55	
Benzene	5,100	700
Carbon Tetrachloride	50,000	
Chlorinated Benzenes		
Monochlorobenzenes	160	129
Dichlorobenzenes	1,970	
Chlorinated Ethanes		
Dichloroethanes	113,000	
Trichloroehanes	31,200	
Tetrachloroethanes	9,020	
Pentachloroethanes	390	
Hexachloroethanes	940	
Chlorinated Ethylenes		
Dichloroethylenes	224,000	
Trichloroethylenes	2,000	
Tetrachloroethylenes	10,200	450
Chlorinated Naphthalenes	7.5	
Chlorinated Phenols		
Monochlorophenols	29,700	
Tetrachlorophenols	440	
Pentachlorophenols	53	34
Dichloropropane	10,300	3,040
Dichloropropene	790	
Dinitrotoluene	590	
Ethylbenzene	430	
Fluoranthene	40	16
Halomethanes	12,000	6,400
Hexachlorobutadiene	32	
Hexachlorocyclopentadiene	7.0	
Isophorone	12,900	
Naphthalene	2,350	
Nitrobenzene	6,680	
Nitrophenols	4,850	
Nitrosamines	3,300,000	
Phenol	5,800	
Phthalate Esters	2,944	
Polynuclear Aromatic Hydrocarbons	300	
Toluene	6,300	5,000
Toxaphene	0.07[b]	
Pesticides/PCB		
Aldrin	1.3[b]	
BHC	0.34	
Chlordane	0.09[b]	0.0040[c]
DDE	14	

TABLE 18-1

ALAMEDA NAS
POTENTIAL CHEMICAL-SPECIFIC ARARS
(Sheet 2 of 2)

	Marine Acute Criteria (µg/L)[a]	Marine Chronic Criteria (µg/L)[a]
DDT	0.13[b]	0.0010[c]
Demeton		0.1
Dieldrin	0.71[b]	0.0019[c]
Endosulfan	0.034[b]	0.0087[c]
Endrin	0.037[b]	0.0023[c]
Guthion		0.01
Heptachlor	0.053[b]	0.0036[c]
Lindane	0.16[b]	
Malathion		0.1
Methoxychlor		0.03
Mirex		0.001
Parathion		0.04
PCB		0.030[c]
TDE	3.6	
Inorganic Compound		
Chlorine	13[d]	7.5[e]
Cyanide	1[d]	
Hydrogen Sulfide		2
Phosphorous		0.10
Metals		
Arsenic	69[d]	36[e]
Arsenic (pent)	2,319[d]	
Arsenic (trivalent)	69[d]	36[e]
Cadmium	43[d]	9.3[e]
Chromium (hexavalent)	1,100[d]	50[e]
Copper	2.9[d]	
Lead	140[d]	5.6[e]
Manganese		100[f]
Mercury	2.1	0.025
Nickel	140[b]	7.1[c]
Selenium (inorganic selenite)	410[b]	54[c]
Silver	2.3[b]	
Thallium	2130	
Zinc	170[b]	58[c]

[a] - All criteria from EPA Quality Criteria for Water 1986. Methods used to establish acute and chronic criteria vary by compound.
[b] - Represents a maximum concentration never to be exceeded.
[c] - Represents a maximum 24-hour average.
[d] - Represents the 1-hour average concentration which may not be exceeded more than once every three years.
[e] - Represents the 4-day average concentration which may not be exceeded more than once every three years.
[f] - Represents maximum allowable concentration to protect human consumers of shellfish.

19.0 CONCLUSIONS AND RECOMMENDATIONS

This report presents a description of activities performed and a summary of the data collected for 10 sites covered by Phases 2B and 3 of the RI/FS at NAS Alameda. The data were collected using sampling procedures and analytical protocols approved by the California Department of Toxic Substances Control (DTSC). The preliminary conclusions presented herein are based on an examination of the data, without the benefit of background data, tidal influence studies, fate and transport analyses, a risk assessment, or a determination of ARARs. A thorough analysis of the data and a reassessment of the preliminary conclusions will be presented in a subsequent remedial investigation (RI) report. The need for additional field work, other than that described in the following recommendations, will also be assessed.

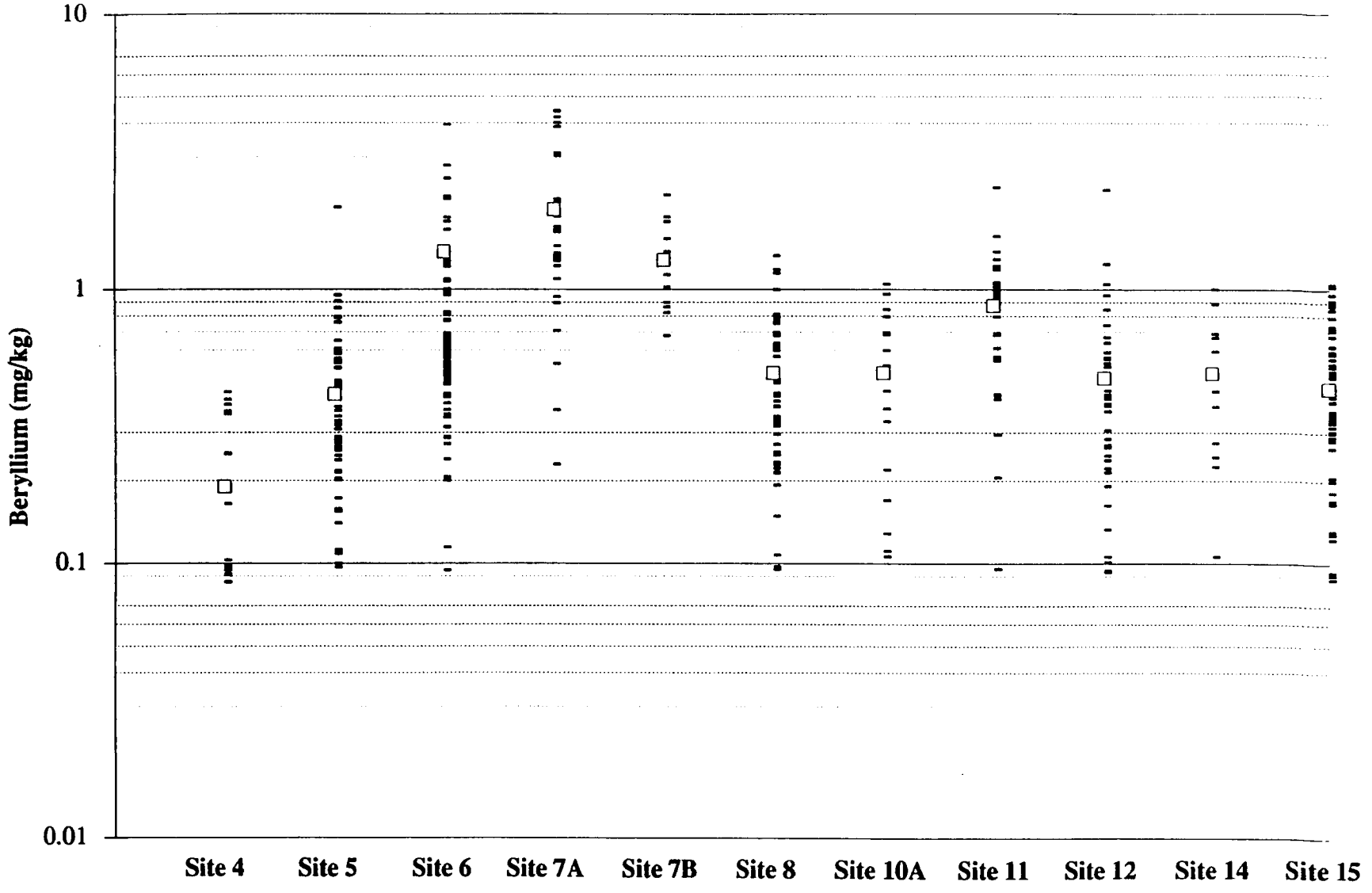
19.1 CHEMICAL COMPOUNDS IN SOIL

Background data for inorganic compounds in soils is not yet available. However, a preliminary analysis of whether elevated metals are present in soils has been made by preparing graphs of selected metals for all sites. Graphs are presented in Figures 19-1 through 19-6. The graphs indicate the relative concentrations of a selected metal for all soil samples at all sites. The graphs allow a comparison between sites, and provide an indication of which sites have relatively higher concentrations of metals in soils when compared to the remaining sites. A description of the comparison is discussed in each site section below. The basis for the selection of these metals is presented in Section 3.2. No other conclusions regarding the levels of metals detected in soils are included.

Organic compounds were found in soils at most of the sites, at levels above normal background concentrations. However, the soil and groundwater media that are impacted by the presence of these organic compounds are generally capped by paved surfaces, and do not pose an immediate threat to human health.

The occurrence of PAH on a basewide basis is discussed in Section 16.0 and no further field work is recommended for this occurrence. No conclusions regarding these compounds are included in the individual site discussions below.

In the absence of a risk assessment, and because no ARARs for compounds in soil have been identified at this stage of the RI/FS process, no recommended actions based on levels of either organic or inorganic constituents in soils are provided. However, where appropriate, recommendations for additional work to delineate the areal extent of constituents in soils have been made.



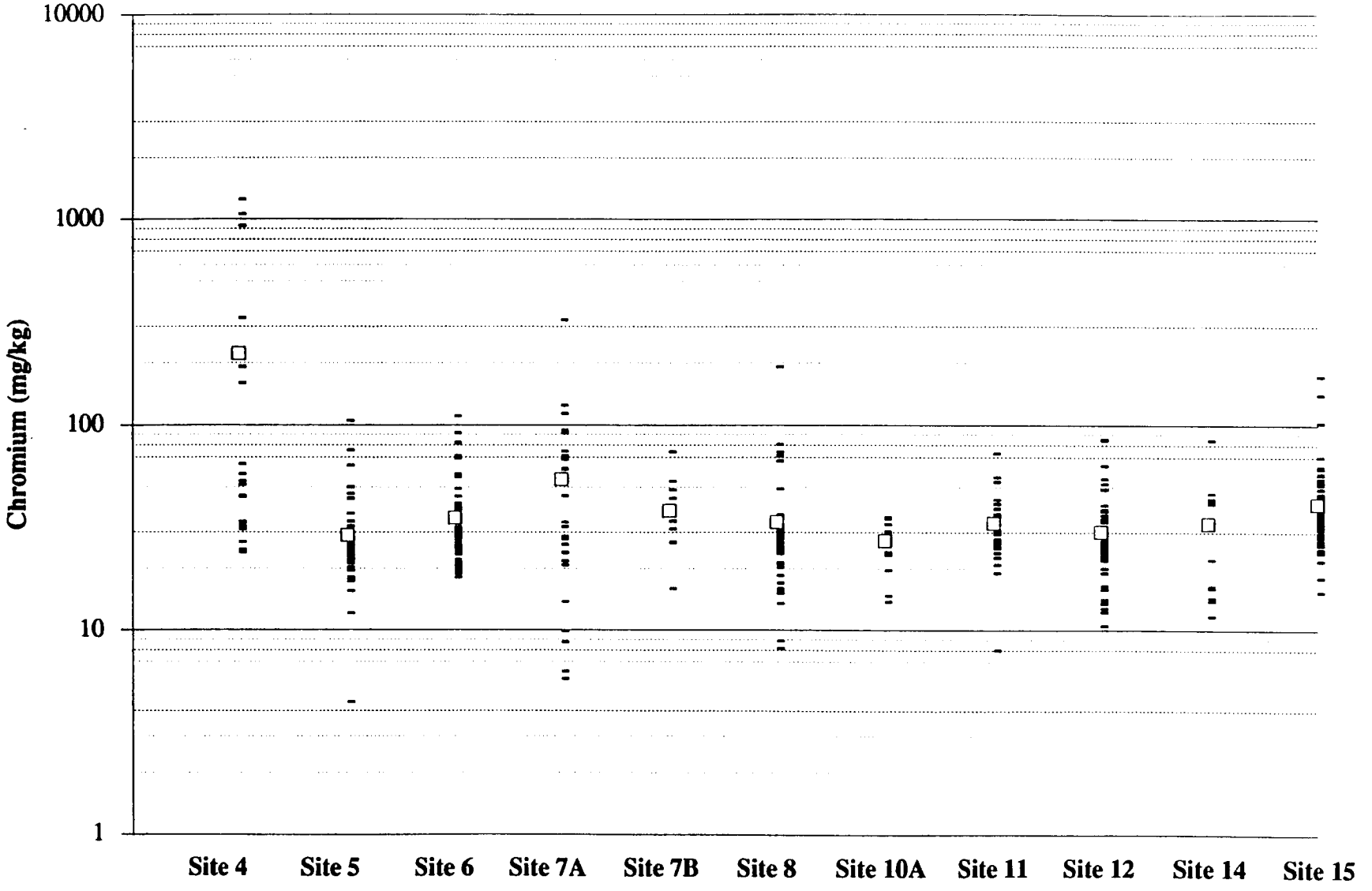
Legend

- Soil Sample
- Average Concentration for Site

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

CONCENTRATION OF BERYLLIUM IN SOIL

FIGURE 19-1



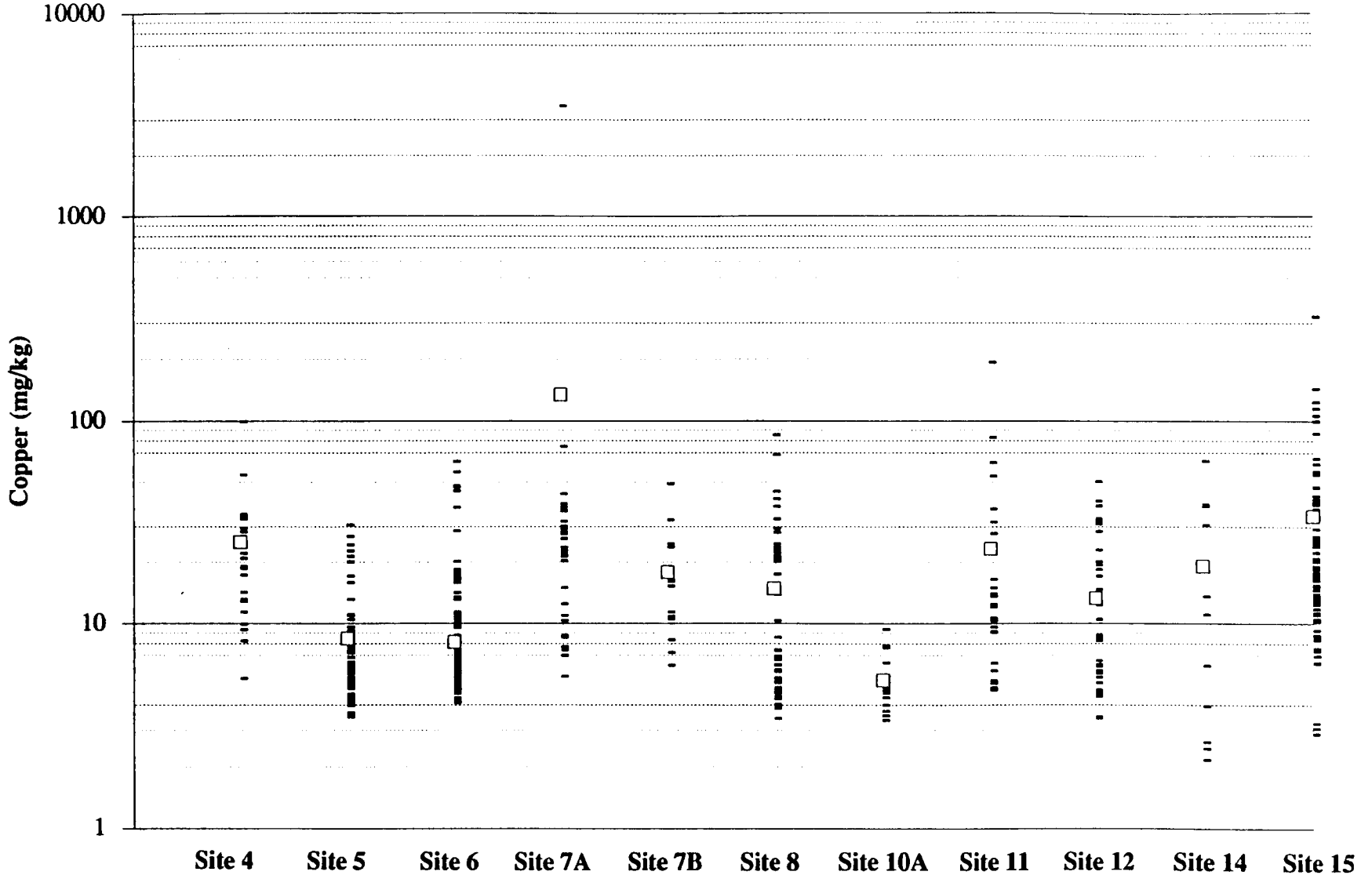
Legend

- Soil Sample
- Average Concentration for Site

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

CONCENTRATION OF CHROMIUM IN SOIL

FIGURE 19-2



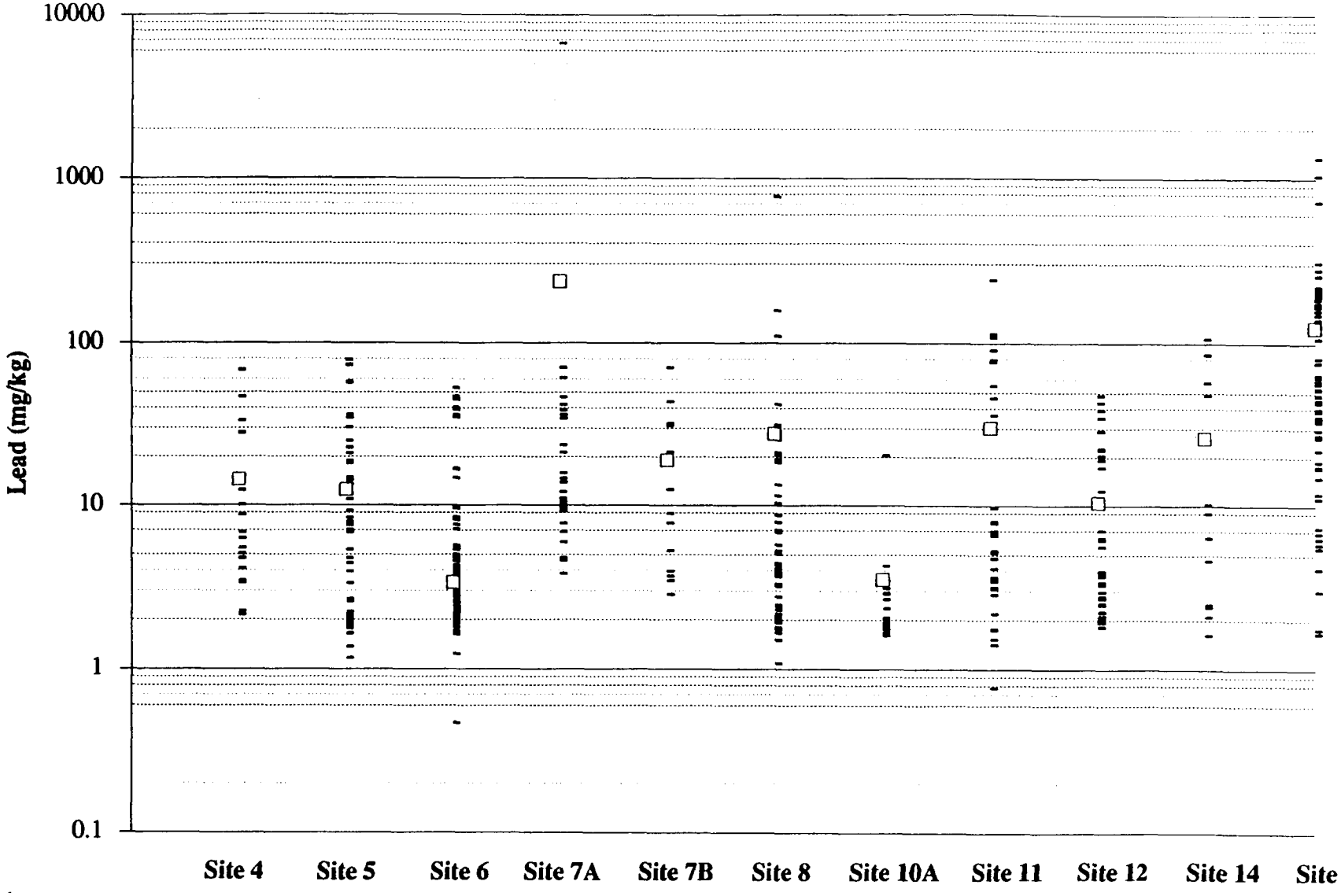
Legend

- Soil Sample
- Average Concentration for Site

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

CONCENTRATION OF COPPER IN SOIL

FIGURE 19-3

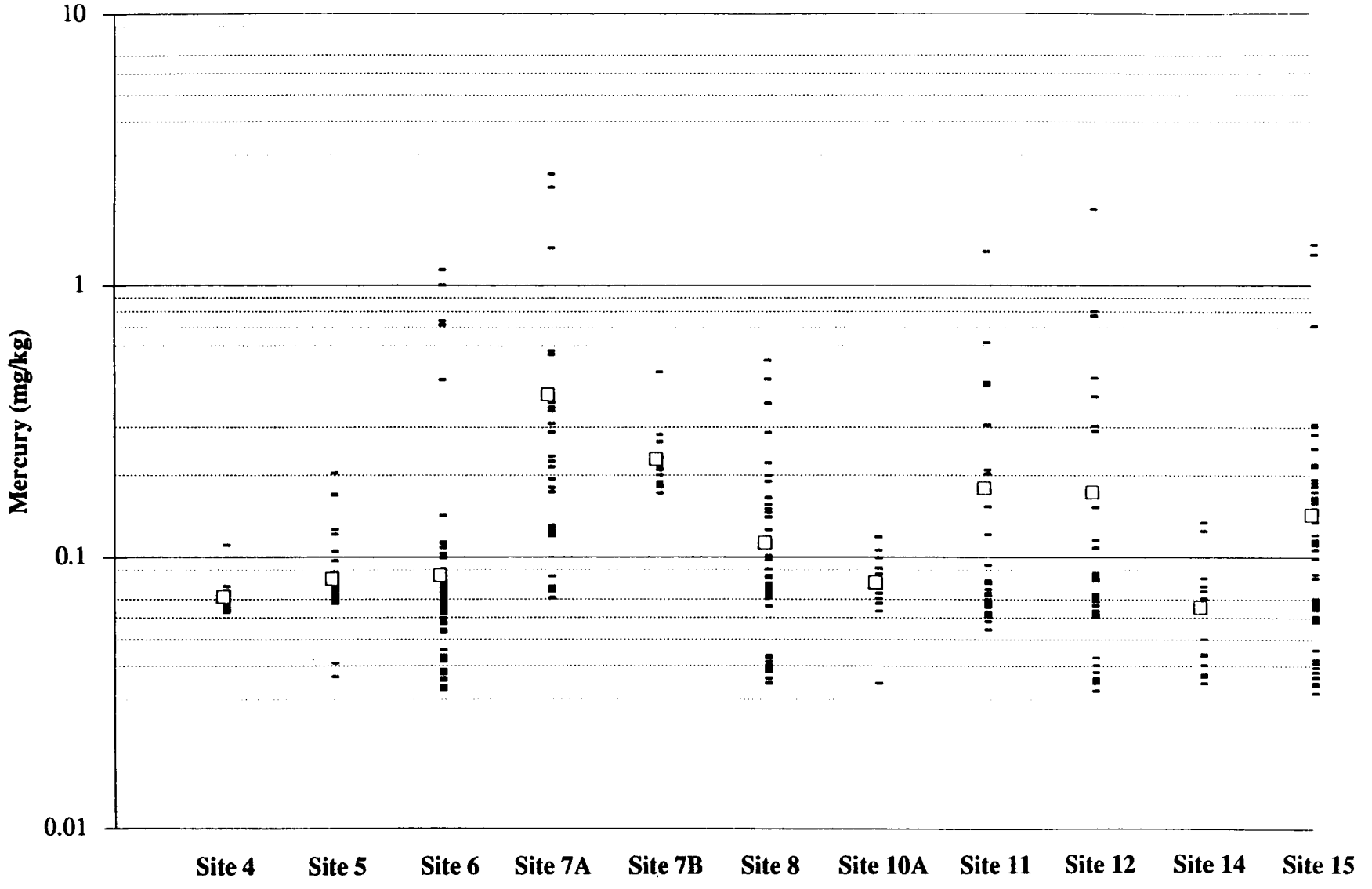


Legend

- Soil Sample
- Average Concentration for Site

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
CONCENTRATION OF LEAD IN SOIL

FIGURE 19-4



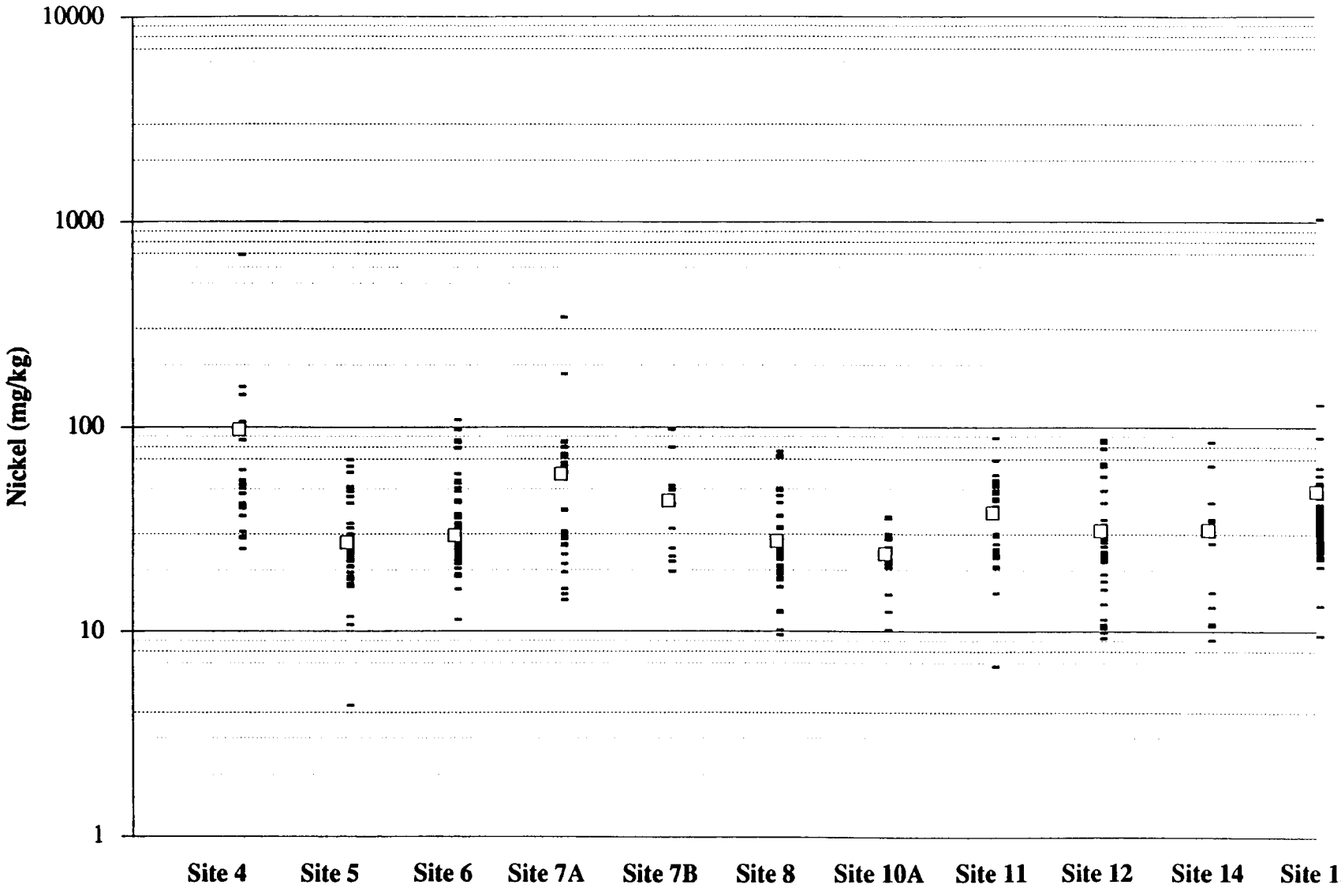
Legend

- Soil Sample
- Average Concentration for Site

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

CONCENTRATION OF MERCURY IN SOIL

FIGURE 19-5



Legend

- Soil Sample
- Average Concentration for Site

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

CONCENTRATION OF NICKEL IN SOIL

FIGURE 19-6

19.2 CHEMICAL COMPOUNDS IN GROUNDWATER

As discussed in Section 2.0 (Site Conceptual Model) and Section 18.0 (ARARs), EPA Marine Aquatic Water Quality Criteria (WQC) are considered potential chemical-specific ARARs in this report. As discussed in Section 3.0 (Criteria for Preliminary Data Evaluation), site-specific fate and transport and groundwater flow modeling results will not be available until the RI report is prepared. Shallow groundwater was predicted to be brackish to saline (ACFCWCD, 1988). This was observed to be true and is probably due to the use of marine sediments as fill, and at some sites, due to tidal influences on the shallow groundwater. With the exception of Site 4, groundwater at all sites is not suitable for human or domestic consumption based on total dissolved solids content and/or specific conductivity.

When observed concentrations of organics and inorganics are compared to the WQC, the concentrations of organics are generally below their respective WQC standard and the inorganic compounds are generally above their respective potential standard. However, the criteria should be applied at the point(s) where groundwater may contact aquatic organisms rather than beneath buildings and paved surfaces at NAS Alameda. Since inorganic constituents are relatively immobile and attenuate well in soil environments, there is a low probability that they will migrate to the Bay or estuary. For the purposes of this data summary report, a preliminary attenuation factor of 10 (one order of magnitude) was applied to compounds identified in groundwater. This attenuation factor is conservative for metals, and will be examined in detail in the RI report. Thus, for the purposes of this preliminary data evaluation, levels of compounds in groundwater trigger a recommendation for additional field investigations only when they are present at concentrations one order of magnitude greater than their WQC.

Conclusions regarding water quality may be modified based upon the results of fate and transport analysis and groundwater modeling performed in later phases of work, or upon a final determination of ARARs.

19.3 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The following subsections contain site specific summaries, conclusions, and recommendations for follow-on field work. In order to define and assess the second water-bearing zone at all of the Phases 2B and 3 Sites, it is recommended that a cone penetrometer test (CPT) survey be performed at each site. The goals of the CPT survey are to evaluate the lithology and hydrogeologic characteristics below a depth of 15 feet and to identify the second water-bearing zone at each site. A grab groundwater sample will be collected from the second water-bearing zone at each CPT survey point using a Hydropunch® sampling device, or equivalent. The grab groundwater samples will be analyzed for the compounds that were detected at elevated

levels in the shallow wells installed during the current investigation at each site. The results of the CPT survey will be used to locate sites for second water-bearing zone wells, with DTSC and RWQCB concurrence. The CPT survey is planned for each site, so it will not be discussed further in the site specific subsections below.

19.3.1 Site 4 - Building 360 Plating Shop

Site 4 consists of Building 360, a large aircraft engine repair and testing facility. Only the plating shop within Building 360 was included in Phases 2B and 3.

19.3.1.1 Summary and Conclusions. The SVOC bis(2-ethylhexyl)phthalate and cyanide were detected in surface soil samples from beneath the plating shop. Cyanide was used in the former plating shop. Because only surface samples were collected, the vertical extent of cyanide in the soil is not known. The bis(2-ethylhexyl)phthalate may have been introduced in the sampling process when decontamination water was stored in plastic bottles.

When compared with metals in soils at other sites investigated in Phases 2B and 3, beryllium, copper, lead, and mercury do not appear to be elevated (Figures 19-1 through 19-6). Nickel and chromium appear to be elevated when compared to the other Phases 2B and 3 sites. These metals are known to have been used in the plating shop and their apparently elevated levels may be related to plating activities.

Groundwater samples from beneath the plating shop contained 1,1,1-TCA, 1,1-DCE, 1,2-DCE, and TCE. These compounds are all common industrial solvents or their degradation products. The solvents may be related to stripping and painting activities at the site. All of the compounds for which marine WQC have been established were detected at concentrations below their respective marine WQC.

The metals copper, cadmium, manganese, and nickel were encountered in groundwater at concentrations exceeding either their respective chronic or acute EPA marine WQC. When the order of magnitude attenuation factor described in Section 3.0 is considered, the concentrations of cadmium and nickel exceed the EPA acute marine WQC only in well G04-09. The concentrations of manganese also exceed EPA marine WQC in G04-09, G04-01 and G04-03.

Due to matrix interference, the detection limits for mercury, nickel, and silver were greater than their respective WQC. Thus, it is not known whether these metals are present in excess of the WQC in these wells. However, if the metals were present at levels below the detection limits, their values would always be less than the WQC after the order of magnitude factor is considered.

Metals concentrations in two samples collected from interior floor surfaces within the plating shop indicate that elevated levels of metals used in the plating process are present. These metals are present at levels high enough to pose a concern during decommissioning. The Navy has closed the shop to personnel working in Building 360 pending further characterization of the interior.

19.3.1.2 Recommendations. The following work is recommended for the Site 4 plating shop:

- Properly decommission the facility and remove and dispose of all liquid and particulate waste from the plating shop interior. Perform additional wipe sampling to further characterize interior surfaces in the plating shop. Submit a work plan for the additional sampling to DTSC for approval prior to initiation of the work. Use the results from this additional sampling to determine appropriate decommissioning procedures.

- Additional soil borings and monitoring wells, beyond what is described herein, are being evaluated as part of Phase 1 and Phase 2A activities. Pending the review of the Phases 1 and 2A data, collect additional soil samples from beneath the plating shop to characterize the vertical extent of cyanide soil contamination.

- To further characterize potential solvent and metals contamination in groundwater, and to provide information on seasonal fluctuations and baseline data for comparison purposes, one year of quarterly groundwater monitoring is recommended. Thus, three additional quarterly sampling events are recommended for the wells installed in Phases 1 and 2A.

19.3.2 Site 5 - Building 5

Site 5 consists of Building 5, which houses an aircraft rework facility.

19.3.2.1 Summary and Conclusions. VOCs were detected in the soil samples from the borings around Site 5. The VOC carbon disulfide may be related to the organic material found in native sediments at the site (Dragun, 1988).

Concentrations of beryllium, chromium, copper, lead, mercury, and nickel in soil samples at Site 5 are generally similar to the average concentrations present at the other sites. However, samples B05-01 at 14 feet, B05-02 at 15 feet, and B05-08 at 14 feet contain metals concentrations at roughly twice

the concentrations in the other Site 5 soil samples. Sample B05-03 at 14 feet exhibited concentrations at roughly three times the values in other Site 5 soil samples. These samples correspond to the fill/native sediment interface.

The VOCs 1,1,1-TCA, 1,1-DCA, 1,1-DCE, and 1,2-DCE were detected in wells M05-03, M05-04, and M05-05. Because of their distribution in groundwater (both up and downgradient), there appear to be multiple sources for the compounds. The VOCs detected are typical industrial solvents and their degradation products. None were present in excess of their respective WQC.

The SVOCs 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2,4-dimethylphenol, and 2-methylnapthalene were detected in well M05-03. This suite of SVOCs is typical of solvents used in paint stripping and metal parts cleaning. Well M05-03 is located upgradient of Building 5, just outside a hangar formerly used in paint stripping operations and adjacent to the wastewater pre-treatment facilities.

Manganese was present in all five wells at levels in excess of the chronic WQC of 100 µg/L. After attenuating the concentration of manganese by an order of magnitude, samples from wells M05-02 and M05-03 still exceed the WQC. The groundwater sample from well M-05-03 contained nickel in excess of the both the chronic and acute WQC of 7.1 µg/L and 140 µg/L, respectively. After attenuating the concentration of nickel by an order of magnitude, it still exceeded the acute WQC.

Additional field investigations are currently underway for Site 5, specifically in the plating shop, at the cyanide destruction unit on the south side of the building, and in two areas previously used as storage areas for hazardous materials and old batteries.

19.3.2.2 Recommendations. Future work recommended for Site 5 is described below:

- Install three additional wells; one in the vicinity of boring B05-13 and one in the vicinity of borings B05-10 or B05-11 to determine if the groundwater has been impacted by the VOCs (1,1,1-TCA and TCE) detected in soil samples in this area. Install the third well to the southwest of well M05-02, upgradient of the site. This well will help determine if the compounds present in the groundwater in well M05-02 are from an upgradient source.

- Collect additional soil samples in the vicinity of boring B05-11 to characterize the horizontal and vertical extent of chlorinated hydrocarbon contamination of soil.

- Sample all existing wells at Site 5 on quarterly basis for three quarters to confirm the presence of compounds detected during the initial groundwater sampling, and to provide information on seasonal fluctuations and baseline data for comparison purposes.

19.3.3 Site 6 - Building 41

Site 6 consists of Building 41. The building houses the Aircraft Intermediate Maintenance Department, an aircraft component repair facility.

19.3.3.1 Summary and Conclusions. The VOCs carbon disulfide, chloroform, xylene, and methylene chloride were detected in Site 6 soils. Carbon disulfide may be related to organic matter found in native soils at the site (Dragun, 1988). Methylene chloride was detected mainly in borings along the southern boundary of the site, in borings located adjacent to sewer lines. Chloroform and xylene were detected in only one sample each, and are viewed as isolated occurrences.

Concentrations of beryllium in Site 6 soils appear to be elevated when compared to other sites included in the Phases 2B and 3 investigation (Figure 19-1). It is not known whether beryllium has been used at the site. Concentrations of chromium, copper, lead, mercury, and nickel do not appear to be elevated (Figures 19-2 through 19-5).

Groundwater at Site 6 flows to the southwest in the eastern portion of the site and to the northeast under the southwestern portion of the site. The apparent trough at the site may be related to the presence of permeable utility trench backfill material in the vicinity of well M06-05.

PCE, TCE, vinyl chloride, and 1,2-DCE were detected in wells M06-01, and M06-02, which are located west of Building 41, located near the wash pad/paint stripping area. All of the detected concentrations are well below EPA marine WQC. Wells located upgradient of the site to the northeast did not contain these compounds. There is presently no information on the extent of contamination chlorinated hydrocarbons present in groundwater to the south of the site.

Copper was detected in wells M06-01 and M06-02 at concentrations greater than the EPA acute marine WQC. Manganese was also detected in M06-01 at a concentration greater than the EPA criteria. When the order of magnitude attenuation factor described in Section 3.0 is applied, neither element exceeds EPA marine WQC.

19.3.3.2 Recommendations. The following future work is recommendations for Site 6:

- Collect additional soil samples in the vicinity of the paint stripping tank/former wash pad to determine the distribution of SVOC in soil and to assess the likelihood of the the paint stripping tank/former wash pad as a source(s) for PAH.

- Analyze all soil samples collected at the site for beryllium in order to further define its distribution in soil.

- Sample the wells at Site 6 quarterly, for three quarters, to confirm the initial results of groundwater analysis, and to provide information on seasonal fluctuations and baseline data for comparison purposes.

19.3.4 Site 7A - Building 459

Site 7A consists of Building 459, the base fuel service station. The station has been in operation since 1966.

19.3.4.1 Summary and Conclusions. A soil gas survey indicates that vapor phase hydrocarbons (BETX) are present primarily in the vicinity of the existing and abandoned fuel USTs, and the existing fuel islands. Results of the survey indicate that vapor phase hydrocarbons are present east of the fence marking the eastern boundary of the base. This may indicate that fuel constituents are migrating off-site in an eastward direction.

Fuel constituents (ethylbenzene, toluene, and xylenes) are present in on-site soils in the vicinity of borings B07A-06 and B07A-07. Concentrations generally decrease with depth and were below detection limits in the 9.5 and 13-foot sample from borings B07A-06 and B07A-07, respectively. The decrease in BTEX concentration with depth may be related to the collection of samples from beneath the groundwater surface. BETX are less dense than water and therefore float. This property tends to inhibit their downward migration within soils below the groundwater surface. Acetone, methyl ethyl ketone, and methylene chloride were detected at low levels in on-site soils, although acetone is believed to be a laboratory artifact.

TRPH were present in soils at concentrations up to 1,490 mg/kg. The concentrations detected in each boring were generally highest in shallow samples collected from within fill material and decreased in

samples collected from native clays underlying the fill. This distribution supports ERM's previous conclusion that the clay appears to be attenuating the downward migration of fuel hydrocarbons in soils.

Pesticides are present in surface soils at three locations. These compounds are probably related to past weed and pest control practices. Based on ERM results (1987), PCBs are present in the immediate vicinity of the former transformer pad. Sampling in this investigation did not detect PCB contamination in other areas of the site. Confirmation sampling by the transformer pad was not included in this investigation.

As indicated in Figures 19-1 through 19-6, concentrations beryllium, copper, lead, and mercury in soils appear to be elevated when compared to levels in soils from other sites. The average concentration for copper and lead is elevated due to one sample with apparently anomalously high levels of these metals (Figures 19-3 and 19-4). When this result is ignored, the remaining samples are similar in copper and lead content to those at other sites.

Due to the strong tidal influence on groundwater flow direction at the site, the downgradient direction from the site has not yet been defined. Water level measurements taken on two separate occasions indicate tidal influences are sufficient to reverse the groundwater gradient at the site.

Copper in excess of the acute WQC of 2.9 µg/L was detected in all wells. After consideration of the order of magnitude attenuation, all wells except W-3 still exceed the acute WQC. After the order of magnitude attenuation is applied, all wells except M07A-02 and W-3 contain manganese levels in excess of the chronic WQC of 100 µg/L.

TRPH were detected in groundwater monitoring wells located within UST backfill areas. No TRPH was identified in groundwater monitoring wells that were located outside of tank backfill areas.

Fuel constituents (BETX) were identified in ERM wells W-1, W-2, and W-3, located within the backfill material around the existing and abandoned fuel tanks. Benzene was detected above the marine chronic WQC of 700 µg/L in wells W-1 and W-3. However, levels in these wells are below the WQC when the order of magnitude attenuation factor is considered.

19.3.4.2 Recommendations. Future work recommended for Site 7A is described below:

- Perform a tidal influence study at the site to determine the groundwater gradient and assist in future well placement.

- Install a minimum of two additional shallow groundwater monitoring wells downgradient of the site. Also, install shallow groundwater monitoring wells along the eastern perimeter of the site to determine if contaminants have migrated off-base.

- Collect quarterly groundwater samples from all the wells on the site (including well W-3) for three quarters.

- Collect additional soil samples in the former transformer pad area to confirm the occurrence and distribution of PCBs.

- Collect additional soil samples in the vicinity of well M-07A-02 to confirm the occurrence and distribution of elevated metals in soil.

- Drill additional soil borings and collect soil samples in the vicinity of the existing fuel USTs and the abandoned USTs to determine the presence of free product on the groundwater surface or fuel constituents in soil.

19.3.5 Sites 7B and 11 - Building 162 and 14

Site 7B consists of Building 162. Site 7B reportedly was formerly used by the Navy Exchange as a fuel station. Site 11 consists of Building 14. The building houses an engine test center and various laboratories.

19.3.5.1 Summary and Conclusions. VOCs including acetone, carbon disulfide, methylene chloride, trans-1,2-dichloroethene, and xylene were detected at both sites. All of the borings at both sites, except B11-02, have TRPH contamination in the surface soil sample. With the exception of borings B11-04 and B11-05, the TRPH concentrations are restricted to the surface sample. The probable source for this contamination is infiltration of spilled hydrocarbons and the possible influence of asphalt pavement base coat material. Borings B11-04 and B11-05 contain higher concentrations of TRPH in the surface sample, and the contamination extends beyond the surface of the soil. TRPH concentrations in these may be related to underground storage tanks (boring B11-04) or past activities along the rail spur (boring B11-05).

Carbon disulfide was detected in native soil samples. It is probably a natural byproduct of biodegradation of organic matter in the native soil (Dragun, 1988).

As illustrated in Figure 19-1 the average concentrations of beryllium in Site 7B and 11 soils appear to be elevated when compared to the average beryllium concentration at other Phases 2B and 3 sites (Figure 19-1). Concentrations of copper, chromium, lead, mercury, and nickel do not appear to be elevated when compared to other sites (Figures 19-2 through 19-6).

Common industrial solvents were found in three of the groundwater samples. TCE, 1,1-DCA, benzene, total 1,2-DCE and vinyl chloride were detected at concentrations below their respective EPA marine WQC.

Copper was detected in all but one of the groundwater samples at concentrations greater than the EPA acute marine WQC. After application of the order of magnitude attenuation factor, the attenuated concentration of copper in M07B-01 was greater than the EPA criteria. The unattenuated nickel concentration in M11-02 exceeded the EPA WQC. However, the attenuated concentration was below the water quality criteria. Nickel is a common plating material in aircraft and marine parts. Copper is a component of bronze, which is commonly used in marine environments. The elevated levels of copper and nickel may be related to the repair of ship components and aircraft engines at the sites.

The detection limits for silver, mercury, and nickel for the groundwater samples collected at the sites are greater than the respective unattenuated EPA marine WQC. Thus, it is not known whether these metals are present in excess of the WQC in these wells. However, if the metals were present at levels below the detection limits, their attenuated values would always be less than the WQC.

19.3.5.2 Recommendations. Future work recommended for Sites 7B and 11 is described below:

- Conduct a records search and perform a geophysical survey to confirm the presence of the suspected USTs located northeast of Building 162 and south of Building 14. If the presence of either set of USTs are confirmed, investigate the area for the possible release of contaminants to the soil or groundwater.

- Drill additional soil borings in the vicinity of B11-04 and B11-05 to define the lateral extent of TRPH.

- Install an additional groundwater monitoring well downgradient of B-11-05 to investigate the depression in the groundwater surface.

- Sample all groundwater monitoring wells at the site quarterly for three quarters. Use these samples to verify evidence of possible copper contamination in groundwater and to provide information on seasonal fluctuations and baseline data for comparison purposes.

19.3.6
~~9.2.6~~ **Site 8 - Building 114**

Site 8 consists of Building 114. The building is used as the center for weed and pest control on the base.

19.3.6.1
~~9.2.6.1~~ **Summary and Conclusions.** The PCB Aroclor 1260 was detected in six surface samples, with the highest concentration in B08-04. Boring B08-04 is located in a grassy area in the northeast portion of the site.

As indicated in Figures 19-1 through 19-6, concentrations of the metals beryllium, copper, chromium, lead, mercury, and nickel in soils do not appear to be elevated when compared to other Phases 2B and 3 sites.

The VOCs 1,2-dichloroethene and benzene were detected in the groundwater sample from well M08-01, located upgradient of Site 8. Benzene and bromacil were detected in the sample from well M08-05. Wells in the downgradient direction (to the northeast and northwest) of M08-05 and M08-01 did not contain these compounds. The presence of contaminants in upgradient well M08-01 may indicate an upgradient source of these constituents to the groundwater.

Groundwater samples from wells M08-01, M08-04, and M08-05 contained copper in concentrations above the Acute WQC. Manganese was detected in excess of the Acute WQC in all of the groundwater samples except from well M08-02. After the order of magnitude attenuation factor is applied, only manganese in well M08-05 exceeds the WQC.

19.3.6.2 Recommendations. The recommended future work for Site 8 is described below:

- Collect discrete surface soil samples from around boring B08-04, which is located in a grassy area on the northeast portion of Site 8. Submit the samples for PCB and metals analyses in order to confirm the results from the initial sampling.

- Conduct further monitoring of water levels in order to fully characterize the variability in the direction of groundwater flow.

- There is presently no information on the extent of contamination to the east of well M08-05. Install an additional monitoring well to the east of existing well M08-05 in order to further define the extent of metals in groundwater.

- After the additional well installation, sample the wells at Site 8 quarterly for three quarters to confirm the initial groundwater sampling results, and to provide information on seasonal fluctuations and baseline data for comparison purposes.

- In order to determine if PAH detected in groundwater samples collected from wells at the site are dissolved or are sorbed to soil particles suspended in the sample, submit filtered groundwater samples along with unfiltered samples for SVOC analysis. If the filtered sample contains PAH, then it is known that the PAH is dissolved in the groundwater

19.3.7 Site 10A - Building 400

Site 10A, Building 400 was used for missile rework operations

19.3.7.1 Summary and Conclusions. Acetone was detected in the five soil samples collected from borings around Site 10A. Bis(2-ethylhexyl)phthalate was detected as an estimated result in one sample. The bis(2-ethylhexyl)phthalate may have been introduced in the sampling process when decontamination water was stored in plastic bottles.

Concentrations of beryllium, chromium, copper, lead, mercury, and nickel in soil samples at Site 10 are generally similar to the average concentrations present at the other sites (Figures 19-1 through 19-6).

The VOCs 1,1-DCA, 1,2-DCE, 1,2-dichloropropane, and TCE were detected in the groundwater sample from well M10A-01. These VOCs are all common industrial solvents or their degradation products. Their presence in M10A-01 may be related to paint stripping processes at Site 10A. Chloroform was detected in well M10A-02 and M10A-03.

Nickel, copper and manganese were detected at levels in excess of WQC. Nickel in well M10A-01 exceeds the chronic WQC of 7.1 µg/L. Copper exceeds the acute WQC of 2.9 µg/L in well

M10A-03. Manganese in excess of the chronic WQC of 100 µg/L was detected in well M10A-02. After factoring the concentrations in the samples by an order of magnitude, all results are below their respective WQC. The detection limits for mercury, nickel, and silver are greater than their respective EPA WQC. Thus, it is not known whether these metals are present in excess of the WQC in these wells. However, if the metals were present at levels below the detection limits, their attenuated values would always be less than the WQC.

19.3.7.2 Recommendations. The following future work is recommended for Site 10A:

- Collect groundwater samples from each well at the site quarterly for three quarters to confirm the initial groundwater sampling results, and to provide information on seasonal fluctuations and baseline data for comparison purposes.

19.3.8 Site 12 - Building 10

Site 12, Building 10 is the base power and steam generation plant.

19.3.8.1 Summary and Conclusions. The presence of carbon disulfide may be related to the organic material found in native sediments at the site (Dragun, 1988).

VOCs including acetone, MEK, and methylene chloride were detected in 10 of 30 soil samples. TRPH were found in all surface soil samples. The source is believed to be the asphalt and base coat material covering the entire area. TRPH were detected at depth in four of the borings.

Concentrations of beryllium, chromium, copper, lead, and nickel in soil samples at Site 12 are generally similar to the average concentrations present at other sites (Figure 19-1 through 19-6). The average concentration of mercury appears to be slightly elevated in comparison to the other sites.

VOCs, PAH, and bis(2-chloroethyl)ether were detected in the groundwater.

Manganese concentrations in all of the Site 12 wells were greater than the EPA chronic WQC. The attenuated concentrations of manganese in M12-01 and M12-02 are below the chronic WQC. The copper concentration in well M12-02 exceeds the EPA acute WQC of 2.9 µg/L. However, after application of the attenuation factor, the concentration does not exceed the WQC. The detection limits for mercury, nickel, and silver exceed the EPA marine WQC. Thus, it is not known whether these metals are present in

excess of the WQC in these wells. However, if the metals were present at levels below the detection limits, their attenuated values would always be less than the WQC.

19.3.8.2 Recommendations. The following future work is recommended for Site 12:

- Sample all groundwater monitoring wells at the site quarterly for three quarters. Use this data to confirm the initial groundwater sampling results, and to provide information on seasonal fluctuations and baseline data for comparison purposes.

19.3.9 Site 14 - Fire Training Area

Site 14 consists of the former Fire Training Area. The area is now used only for automobile rescue training; burning activities ceased in 1986 or 1987.

19.3.9.1 Summary and Conclusions. Soil gas data suggests that volatile aromatic hydrocarbons exists in vapor phase only inside the bermed area. No aromatic hydrocarbons were detected in the soil borings.

TRPH contamination in soils was detected outside the bermed area in all three borings drilled at the site. It is not known whether the TRPH contamination is due to burning activities in the bermed area or surface infiltration of hydrocarbons released during rescue training.

Pesticides and PCBs were detected in surface soil samples. Canonie's work plan indicates that PCB oil was used at Site 15 (located in the vicinity of the FTA) to control weeds. It is not known whether this practice was employed at Site 14.

Figures 19-1 through 19-6 indicate that concentrations of the metals beryllium, copper, chromium, lead, mercury, and nickel do not appear to be elevated when compared to the remaining Phases 2B and 3 sites.

Copper was detected in well M14-01 at a concentration in excess of the acute WQC. After the order of magnitude attenuation factor is considered, the copper result is below the WQC. Low concentrations of acetone and 1,2-DCE were also detected in well M14-01. The concentration of 1,2-DCE is below the WQC. No EPA WQC have been established for acetone.

19.3.9.2 Recommendations. The following future work is recommended for the FTA:

- Sample a surface grid outside the bermed area systematically for TPH(diesel) and PCBs to determine the type and extent of contamination. Analyze several of the surface samples for dioxin/furan to confirm the initial soil sample results.

- Conduct subsurface soil sampling inside the berm, through the berm, and in the vicinity of the sump to confirm the presence of aromatic hydrocarbon contamination identified by soil gas.

- Conduct three quarterly rounds of groundwater sampling. Use the quarterly sampling data to confirm the initial sampling results and to provide information on seasonal fluctuations and baseline data for comparison purposes

19.3.10 Site 15 - Buildings 301 and 389

Site 15, consists of the areas around Buildings 301 and 389. This area was formerly used as a transformer storage area.

19.3.10.1 Summary and Conclusions. Surface soils at Site 15 contained pesticides and PCBs. The pesticides 4,4'-DDD, -DDE, and -DDT, aldrin, dieldrin, endrin ketone, chlordane, and lindane were identified. The occurrence in surface soils was sporadic and does not appear to be related to a point source. The most likely source of the detected compounds is past pest control practices.

The PCB Aroclor 1260 was detected in 58 of 61 surface soil samples collected. Concentrations detected in surface samples ranged from 140 µg/kg to 19,000 µg/kg. PCB oil was used in the past for weed control at the site. The areal extent of surface soils containing PCBs was not defined.

The soil sample from 2 feet in boring B15-01 contained the SVOCs 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 2,4-dinitrotoluene, 2-chlorophenol, 2-methylnaphthalene, 4-chloro-3-methyl phenol, N-nitrosodi-N-propylamine, and phenol. Several of the compounds listed above are related to fuels, (1,2,4-trichlorobenzene, 1,4-dichlorobenzene, and 2-methylnaphthalene). 2,4-dinitrotoluene is used in munitions.

Concentrations of beryllium, chromium, mercury, and nickel in soil samples at Site 15 are generally similar to the average concentrations present at the other sites (Figures 19-1 through 19-6). The average concentrations of copper and lead appear to be slightly elevated in comparison to the other sites.

VOCs, SVOCs, pesticides/PCBs, and TRPH were not detected in any of the groundwater samples collected from the wells at Site 15.

All metals except manganese were below the detection limits and/or EPA chronic or acute WQC. After applying the attenuation factor, manganese is present above the chronic WQC of 100 µg/L in the sample from well M15-02.

19.3.10.2 Recommendations. The following future work is recommended for Site 15:

- Sample all groundwater monitoring wells quarterly for three quarters. Use this information to confirm the initial groundwater sampling results, and to provide information on seasonal fluctuations and baseline data for comparison purposes.

- Expand the surface soil sampling grid to determine the areal extent of the PAH, pesticides/PCBs, and metals.

20.0 RESPONSE TO COMMENTS

This section presents the Navy's response to comments received from the State of California Environmental Protection Agency Department of Toxic Substances Control (DTSC) on July 30, 1992. The DTSC comments are presented verbatim in bold typeface. The Navy responses are in normal typeface.

Additional field work is planned for all Phases 2B and 3 sites to accomplish the goals described in the recommendations section of the Phases 2B and 3 DSR and to address the DTSC comments found in this section. The details of the future work will be provided in a work plan to be submitted to DTSC.

GENERAL COMMENTS

General Comment #1: **Unless otherwise indicated all comments refer to Volume 1 of the Data Summary Report.**

Response to Comment: No response needed.

General Comment #2: **You proposed that Water Quality Criteria (WQC) for the protection of marine life be used as standards to determine if any further investigation is needed. We concur with this determination except in instances where the Maximum Contaminant Level (MCL) for drinking water are more stringent than the WQC, as in organics. Unless Alameda NAS provides sufficient information to show that the ground water do not meet the criteria for drinking water, the ground water in ANAS is considered drinking water potential.**

In determining whether further investigation is needed, the Department used both MCL (organics) and WQC (inorganics) in screening the data. We did not use ANAS proposed attenuation factor. The DTSC's review did not result in a significant modifications to Navy's conclusions and recommendations.

Response to Comment: Future quarterly monitoring will include analysis of TDS in all wells. This information will be used to determine whether the groundwater at NAS Alameda meets the criteria of 3,000 mg/L to be classified as a potential groundwater source (State Water Resources Control Board Resolution No. 88-63). The applicability of MCL's as ARARs will be reevaluated when these data are available.

General Comment #3: **We recommend that for ease in review of future reports that ANAS use "spider map" when presenting analytical result at each sampling point for both soil and ground water.**

Response to Comment: We interpret "spider map" to mean a site map with analytical data for each sampling point summarized on the map. This format will be used in future reports submitted for investigations at NAS Alameda.

However, the "spider map" format will not be used in the Final Phases 2B and 3 DSR.

General Comment #4: **We would like to reiterate our point made in a letter dated January 29, 1992 that "cleanup levels" even for metals will strictly be derived from health based risk assessment.**

Response to Comment: We recognize that cleanup levels will be risk-based and have not proposed alternative cleanup levels.

General Comment #5: **Recommendations for additional investigations for soil and groundwater lack some details such as: number, depths and locations.**

Response to Comment: The objective of the DSR is to provide a summary of the results of the Phases 2B and 3 investigation and to identify where additional field investigation is needed. The DSR meets these objectives. Details about the number and types of samples to be collected will be provided in the work plan prepared for the recommended additional investigations. The work plan will be submitted for DTSC review prior to implementation of the additional investigations.

General Comment #6: **Copies of all original field logs should be provided.**

Response to Comment: Original field logs are reviewed by senior personnel after field work is completed. Logs are checked for consistency and descriptions are compared to archived soil samples collected at the time of drilling. In this review process, logs are edited. The edited versions submitted to the DTSC in the Data Summary Report are accurate and complete and provide information in a format more easily interpreted than the original field logs.

General Comment #7: **For ease of review, please provide narratives and explanations of formula every time calculations are involved, as when deriving hydraulic conductivities from the slug tests.**

Response to Comment: This information will be provided in future reports.

General Comment #8: **Submit Baseline Risk Assessment and Preliminary Remedial Action Alternatives for contaminants at each site or operable unit. The purpose of this is to initiate the process with the best available information and continue to refine them as information is acquired.**

Response to Comment: In a meeting between the Navy and the DTSC on September 17, 1992 the DTSC agreed that the Navy does not need to prepare a baseline risk assessment and develop preliminary remedial action alternatives for the chemical detected at each site in this phase of work. The baseline risk assessment and the preliminary remedial action alternatives will be developed during preparation of the RI/FS report (Phases 7 and 8).

General Comment #9: **For future reports, provide a map of each site showing at least 300 feet radius beyond its boundary. The building number and its uses should be identified if obtainable.**

Response to Comment: This information will be provided in future reports.

General Comment #10: **Where source(s) of contamination have been identified and could pose health hazards to the public or the environment, immediate source removal or containment may be necessary to prevent spread of contamination. Sites 4 (Plating Shop) and Site 7A (fuel service station) fit this category.**

Response to Comment: For discussion of Site 4, see response to Section 5, Site 4 specific comment #1.

We feel that it is premature to propose remedial measures until the extent of contamination at Site 7A is delineated. Until the extent of contamination is understood, remedial measures will be unfocussed and may not protect human health and the environment. Once the nature and extent of contamination at Site 7A is understood, rational remedial alternatives will be chosen. Further investigation at Site 7A includes investigation of the abandoned USTs (Section 8, Site 7A specific comment #1), additional soil sampling to confirm PCB levels (Section 8, Site 7A specific comment #6), a CPT survey to identify and delineate the potential second water-bearing zone (Section 5, Site 4 specific comment #3), and installation of shallow wells along the eastern perimeter of the site to monitor for off-site migration of contaminants (Section 8, Site 7A specific comment #7).

General Comment #11: **Chapter 16, 1 of 2 of the Data Summary Report, page 16-6, provides explanations on the presence of PAH within the fill. Because of the different concentrations of PAH found at varying depths at several sites it would be best address when Baseline Risk Assessment for each site is being conducted.**

Response to Comment: As discussed in general comment #8, it was agreed that the baseline risk assessment will be conducted as part of the Phase 7 activities.

General Comment #12: **You have recommended three additional quarterly monitoring. We concur with the general concept of studying the effect of seasonal fluctuations. However, the detail or what kind of information will be provided as a result of this study was not discussed. Another proposed use of the additional quarterly monitoring is to set up data baseline. It was also not clear what the purpose of this or how this data baseline will be put together. You may proceed, however, with the quarterly monitoring but need to provide information indicated above.**

The quarterly monitoring should be implemented immediately upon receipt of these comments with at least 5 days notification to concerned agencies prior to the start of field task.

Response to Comment: As indicated in the Data Summary Report, quarterly monitoring data will be used to confirm the presence of compounds detected in the original sampling, and to provide information on seasonal fluctuations and baseline data for comparison purposes.

The quarterly monitoring results will be presented in tables summarizing analytical results, a discussion of trends in concentrations that may be identified, and a discussion of seasonal variations in groundwater quality. The baseline data established by the quarterly monitoring program will be used in the risk assessment, and remedial investigation during Phase 7.

Due to Navy contracting procedures, the quarterly monitoring program cannot be implemented immediately. When the contracting process is completed, we will inform the DTSC and establish a schedule for implementing the quarterly monitoring.

General Comment #13: **All Underground Storage Tanks (USTs) that have detected floating products in the soil or in ground water should be further investigated either by trenching or by some other means. If floating products exist, the focus of investigation should be geared towards the removal of the source or containment to prevent further spread of contamination.**

Response to Comment: No floating product was observed during the Phases 2B and 3 investigation. Should floating product be encountered in future investigations at the RI/FS sites with USTs, the DTSC will be immediately notified and appropriate remedial actions will be undertaken, as necessary.

General Comment #14: **It is not too early to propose a site or combination of sites as operable units. We encourage the Navy to initiate this process as early as possible.**

Response to Comment: We do not propose to define operable units at this time because the extent of chemicals in soil and groundwater have not been adequately defined. The Navy will re-evaluate this issue after the completion of the additional field investigation planned for 1993.

SPECIFIC COMMENTS

Section 5. Site 4 (Building 360)

Specific Comment #1: **Although there are other investigations that have been done on this site and results still need to be submitted, the concentration of Cr, over the MCL and the WQC limits in the ground water and in soil at alarming levels, are apparent all over Site 4. Also the presence of organics (TCA, TCE, DCE, DCA, and even Bis-2 (ethylhexyl)phthalate) in the ground water even above the MCLs on some are apparent. There is no doubt that the source of contamination came from the years of operating this shop which has leached out to the soil and to the ground water. Because of the high concentrations of chromium found in ground water and in soil, it is necessary for the Navy to initiate an interim remedial action to contain or prevent the spread of contamination of chromium in soil and ground water.**

Response to Comment: The Navy believes that an interim removal action is premature without the knowledge of the extent of contamination. Further sampling is proposed to determine the nature and extent of chromium in the soil and groundwater (see Specific Comment #3 and response).

Specific Comment #2: **Elevated metal concentrations were observed in ground water at B-04-0. A grab ground water sample should be collected in the vicinity of this boring to confirm detected levels.**

Response to Comment: No groundwater samples were designated B-04-0. Soil sample identifiers begin with a "B"; however, no soil sample was designated B-04-0.

Specific Comment #3: **You have indicated that additional soil borings and monitoring wells are being evaluated as part of Phase 1 and 2A activities. However, additional shallow and deep wells should be installed downgradient of Site 4 to determine the horizontal and vertical extent of ground water contamination.**

Response to Comment: These issues will be addressed in the work plan prepared for the additional work recommended in the Data Summary Report. As discussed in the October 6, 1992 between WESTDIV, PRC, JMM, DTSC and the RWQCB, a cone penetrometer test (CPT) survey will be conducted at each site as part of the additional field work. The goal of the CPT survey will be to determine lithology below a depth of 15 feet and identify the second water-bearing zone. Grab groundwater samples will be collected from the second water-bearing zone with a Hydropunch® device. These samples will be analyzed for compounds which were identified at high concentrations in the existing shallow wells. The number and location of shallow and deep wells to be installed during the follow-on field work will be determined after the CPT survey, with DTSC and RWQCB concurrence. The CPT survey is planned for all of the Phases 2B and 3 sites.

Specific Comment #4: **Acceptable detection limits for mercury, nickel and silver should be used for the next sampling round for ground water and compared to WQC without using any attenuation factor (this is applicable to most sites).**

Response to Comment: Methods recommended by the EPA contract laboratory program were used for analysis of the metals mercury, nickel, and silver. High levels of sodium and other constituents present in groundwater samples resulted in interferences and thus, the samples required dilution. The dilutions resulted in detection limits in excess of WQC.

The attenuation factor applied in the DSR is a conservative estimate in the absence of fate and transport data. Fate and transport data will be calculated for the Phase 7 RI. The fate and transport information will be used to assess the concentration of contaminants actually reaching the receptors (SF Bay in this case).

Specific Comment #5: **DTSC concurs with your recommendation that the plating shop be decommissioned and all liquid and particulate waste should be removed from the interior for proper disposal. Also include in your**

decommissioning plan procedures for decontaminating walls, interior and exterior surfaces of fixtures.

Response to Comment: Plating shop decommissioning is currently underway. The work is being overseen by the NAS Alameda Environmental Office. The contact for the project is Randy Cate (510) 263-3716

Specific Comment #6: **Deeper soil samples should be collected to determine the vertical extent of cyanide contamination.**

Response to Comment: Deeper soil samples will be collected. The details of this work will be presented in the work plan for additional work at Phases 2B and 3 sites to be submitted at a later date.

Specific Comment #7: **You have stated that the presence of bis(2-ethylhexyl) phthalate may have been introduced in the sampling process when decontamination water was stored in plastic bottles. Is this a normal practice? Are there plans in-place to ensure that this do not happen in the future.**

Response to Comment: Storing water in plastic bottles is a normal practice. The water is delivered from our supplier in 5-gallon plastic bottles. Bis(2-ethylhexyl)phthalate is a common plasticizer and may also be attributed to other steps in the sampling process or to laboratory contamination. In all future phases of work, source water samples will be collected on a more frequent basis. Analysis of source water samples will provide information on the amount of bis(2-ethylhexyl)phthalate that may be attributed to storage in plastic bottles.

Section 6. Site 5 (Aircraft Rework Facility)

Specific Comment #1: **Trichloroethane (TCA) and Trichloroethylene (TCE) were detected at elevated concentrations of 39,000 µg/kg and 2,200 µg/kg at B05-11-014. Collect and analyze soil samples at the vicinity of B05-11 at proposed original depths and a grab ground water sample. If confirm, submit plan to define the horizontal extent of soil contamination. Since the contamination is outside the building it could be an indication of another source or a hot spot.**

Response to Comment: Additional investigation in the vicinity of boring B05-11 will be included with the additional work recommended in the Data Summary Report.

Specific Comment #2: **Although in your summary you have indicated that TCA, TCE, DCE, and DCA, are not present above the WQCs, still these volatiles are found to be above MCLs in M-05-02, M-05-03, M-05-04, and M-05-05.**

Some volatiles including derivatives of fuels are found to be present in soil at the surface to about 4 feet deep at M-05-03, M-05-08, and B-05-10. TCE, TCA ... could come from the operation. The presence of volatile organics from fuel derivatives need to be further investigated.

Response to Comment: Further investigation of fuel constituents will be included with the additional work recommended in the Data Summary Report.

Specific Comment #3: **DTSC concurs with your proposal to install three monitoring wells at the said locations. However, additional wells should be installed at the deeper water bearing zone downgradient of M-05-05 to monitor for the presence of contaminants and define lithology at this site. In addition, the well supposedly to be installed upgradient of M-05-02 should be placed further upgradient to also determine any upgradient source for ethylbenzene, toluene, and xylene.**

Response to Comment: See response to Section 5, Site 4 specific comment #3 for a discussion of the plans for investigation of the second water-bearing zone.

The shallow well that is proposed to be installed upgradient of M-05-02 will be placed to the southwest of M-05-02, not to the west as the text states. A southwest placement will locate the new well directly upgradient of M-05-02.

Section 7. Site 6, Bldg. 41 (Aircraft Intermediate Maintenance Facility)

Specific Comment #1: **Provide the following information for the paint stripping tank/former wash pad, the hazardous waste storage area, and the solvent tank: capacity, the date the units started operating, and the hazardous materials that were handled in the units.**

Response to Comment: This information will be provided in the Final Data Summary Report, Sections 7.1 and 7.2.

Specific Comment #2: **Has leak test been done on the solvent and the paint stripping tanks? If not, leak test, and trenching or other procedures should be performed to determine any past spillage or leakage. These tanks could be possible sources of the volatiles detected in ground water at wells M-06-01, and M-06-02.**

Response to Comment: The solvent tank currently located west of the building is an aboveground storage tank. The former paint stripping tank that was located in the vicinity of the wash pad was also an aboveground tank.

Specific Comment #3: **Semi-volatiles are found to be present in the soil surface and at two feet deep in the southwestern portion of the building (B06-17 and B06-1). In contrast to semi-volatiles detected at deeper locations (11' to 14' deep) at other sites, source for these contaminants are coming from the surface. Could it be from the paint stripping tank/former wash pad? These need to be investigated further.**

Beryllium (Be) is also consistently present in the soil at different depths at concentrations higher than the other sites. A study should be conducted to determine the source of the Be in this site.

Response to Comment: As part of the Phases 2B and 3 additional field work, additional soil samples will be collected in the vicinity of the paint stripping tank/former wash pad to assess the distribution of semi-volatile organic compounds.

All soil samples collected during additional field work at this site will be analyzed for metals.

Section 8. Site 7A, Bldg. 459 (Navy Exchange Fuel Station)

Specific Comment #1: **Provide the following information regarding the two abandoned fuel underground storage tanks (UST) such as: type of fuel stored in the tanks, capacity, where there evidence of spill or leakage observed in the soil surrounding when the tanks were removed, if observed where remediations performed in the soil or ground water.**

According to the DSR, Section 8.3 (2nd par.), free product in the ground water was seeping into ERM's B-1 and B-2, adjacent to the abandoned tanks, and appeared to be present underneath the concrete slab that overlies the abandoned tanks. If remediations were not recorded, this information has to be verified by performing further investigation such as trenching in the immediate area of the abandoned tanks or other appropriate procedure to verify the presence of free product.

Response to Comment: The USTs were abandoned in place so there is no information regarding their removal or observations made during their removal. Information, if it exists, regarding the type of fuel stored in the tanks, capacity, etc. will be provided in Section 8.2 of the Final DSR.

Further investigation to determine the presence of free product will be conducted in the vicinity of the abandoned tanks with the additional work recommended in the DSR.

Specific Comment #2: **DTSC called the Navy's Environmental Department to verify the integrity of existing tanks, however, conflicting information were received regarding the results of leak test performed on these tanks. Please verify with Navy about leak tests on these tanks and update information in the Data Summary Report. Extra efforts should be put in obtaining the most current information.**

If information indicate that any of the existing tanks fail to pass the leak test, similar investigation should be performed as in number 2, 2nd par.

Response to Comment: The most current leak test information obtainable from the NAS Alameda Environmental Office will be included in Section 8.2 of the Final DSR.

Existing USTs that have recently failed a leak test or have been determined to have recently leaked by other methods (ie. inventory reconciliation) will be addressed separately as part of the Navy's UST program.

Specific Comment #3: **Similar investigations such as trenching or other appropriate procedures should be performed on the waste oil and solvent USTs if no record of abandonment procedures, records of whether evidence of soil contamination surrounding soil and ground water were noted.**

Response to Comment: Because the waste oil and solvent USTs are currently active, no records of abandonment procedures and accompanying notes on the condition of soil and groundwater are available. Investigations in the vicinity of these tanks (boring M-07A-01 and ERM borings B8 and B9) did not detect waste oil constituents or solvents in either the soil or groundwater.

Specific Comment #4: **If during investigations, the Navy observed floating products, DTSC should be notified immediately.**

Response to Comment: If free product is noted during performance of additional work at Site 7A, the Navy will notify DTSC immediately.

Specific Comment #5: **A whole list of elevated metal concentration were detected in the soil at two and seven feet below the surface at M-07A-02. Confirm results by collecting soil samples at the vicinity of M-07A-02 at 0, 2, 7, and 13 feet deep.**

Response to Comment: Additional sampling in the vicinity of M-07A-02 will be conducted to delineate the extent of elevated metals in soil.

Specific Comment #6: **Collect two additional soil boring at the former transformer pad at appropriate depths and analyze for PCB and the whole metal scan.**

Response to Comment: Additional soil sampling in the vicinity of the former transformer pad was recommended in the DSR and will be performed.

Specific Comment #7: **Install shallow wells east of Site 7A beyond the Navy property, and south and west (housing) of the site to determine if ground water is being affected in this area. Also, install deeper wells downgradient of the site once ground water direction has been determined to monitor the second water bearing zone.**

Response to Comment: Additional investigation east of Site 7A was proposed in the DSR and will be performed. See Section 5, Site 4 specific comment #3 for details of the planned approach for the second water-bearing zone.

Specific Comment #8: **Provide boring logs for wells W-1, W-2 and W-3.**

Response to Comment: This information is provided in Appendix C of the Final DSR.

Specific Comment #9: **There are several types of contaminants in this site. Occurrence of semi-volatiles (mostly PAH) are mostly in the upper surface up to seven feet. Please investigate further what the possible sources are.**

Arsenic, Barium, Antimony, and Beryllium is in ground water above MCL at Well W3. This needs to be confirmed in the next quarterly ground water monitoring.

Response to Comment: As discussed in Section 16.0, Basewide Occurrence of Polynuclear Aromatic Hydrocarbons in Soil, the source of the PAH compounds identified at NAS Alameda is thought to be the former refinery that operated on the island at the turn of the century. The PAH identified at Site 7A are found at the highest levels at or near the contact between native soil and fill material. The PAH were probably present on the surface of the native soil prior to deposition of the fill material and subsequent construction of the base. The contact between the native material and the fill is shallow at Site 7A, because Site 7A is located in the former marsh area.

Well W3 will be included in future quarterly monitoring and samples will be analyzed for metals.

Section 9, Sites 7B and 11, Building 162 and Building 14, (Service Station and Engine Test Shop).

Specific Comment #1: **If record indicates that 7B was formerly used as a service station, as stated in Page 9-1, Section 9.1.1, 1st par., geophysical methods or other appropriate methods should be used to locate USTs.**

Response to Comment: The original work plan prepared by Canonie refers to Site 7B as an area "formerly used by the Navy Exchange as a service station." Canonie did not reference their source for this information. Canonie states in Section 3.9.1.1 and 3.9.1.2 of their work plan that they were unable to locate information regarding the presence of underground tanks or the operations of a former service station. They concluded in Section 3.9.1.2 that "possibly only administrative activities by the Naval Exchange occurred at this site." New information has not been discovered to suggest that the site has ever been used as a service station. The earliest obtainable aerial photograph showing the current building on the site is dated March 24, 1947 (Pacific Aerial Surveys Photo AV-11-08-06). This is approximately ten years after the completion of the first buildings on the base. An aerial photograph taken on September 27, 1940 (Pacific Aerial Surveys Photo AAP-2-22) shows no building on the site. Based upon the lack of evidence and the fact that early aerial photographs do not show a service station, we believe the probability that the site was used as a service station is very low.

However, as described in Section 9.1.1 of the DSR, there is surface evidence of underground tanks near the northwest corner of the site. During the additional work for Phases 2B and 3, geophysical methods will be used in the northwest corner of the site to locate these USTs, if they exist. Additionally, Navy records will be consulted regarding these potential USTs.

Specific Comment #2: **If evidence suggests the presence of USTs as indicated in Section 9.1.1, 2nd par., ANAS should verify this information. Presence of floating products should be immediately reported to the Department.**

Response to Comment: As described in the response to Specific Comment #1, this information will be verified during performance of the additional field work. If floating product is encountered the Navy will immediately notify DTSC.

Specific Comment #3: **Provide the boring log for well WA-8.**

Response to Comment: This information is included in Appendix C of the Final DSR.

Specific Comment #4: **A ground water monitoring well should be installed downgradient of B-11-05 to intercept contaminants in the trough area.**

Response to Comment: Additional investigation along the storm drain, and the associated depression in the groundwater surface, will be performed during the additional field work.

Specific Comment #5: **We concur with your conclusion and recommendations to define the lateral extent of TPH.**

Response to Comment: The scope of this work will be described in a work plan to be submitted at a later date.

Section 10, Site 8, Building 114 (Pesticide Storage Area)

Specific Comment #1: **The PAH detected in soil at this site in several borings such as B08-04-014, B08-08-014 and duplicate, B08-09-014 and duplicate, and B08-11-014 are extremely high. Study has shown that PAH are strongly sorbed in soil because of its high K_{OC} and K_{OW} and considering other factors. At this site, however, ground water is very shallow (at an average depth of six feet below the surface) and with extremely high concentrations of PAH at 14 feet deep below the surface, the likelihood of these constituents leaching is inevitable as shown in ground water samples although PAH were detected at lower concentrations. What is not known is how much PAH will leach out to ground water at these conditions. Also, other factors have to be taken into consideration before we can make any determination on what impact PAH has on the environment.**

Response to Comment: The PAH detected in groundwater samples from this site may be dissolved or they may be sorbed to soil particles suspended in the sample. To determine this, filtered semi-volatile organic compound samples will be collected during future groundwater sampling. The filtering will remove soil particles from the groundwater sample. Analysis of the filtered sample will determine if dissolved PAH are present in the groundwater. For comparison with past sampling events, unfiltered samples will also be collected for semi-volatile analysis.

Specific Comment #2: **We concur with your recommendation to take additional surface soil samples and to analyze for PCB at the northeastern portion of the site. However, composite samples are not acceptable therefore discreet samples should be taken instead. Also, include for analysis the whole metal scan because high concentrations of lead and zinc were found in this area.**

Response to Comment: Discrete rather than composite samples will be collected. Samples will be analyzed for PCBs and metals.

Specific Comment #3: **We also concur with your recommendation on installing additional well east of M-08-05.**

Response to Comment: No response needed.

Specific Comment #4: **Deeper borings should be taken at appropriate locations to further define the site's lithology, and determine the existence and depth of a second water bearing zone.**

Response to Comment: See the response to Section 5, Site 4 specific comment #3 for the approach to identify the second water-bearing zone.

Section 11, Site 10A, Building 400 (Missile Rework Operations)

Specific Comment #1: **Acceptable detection limits for mercury, nickel, and silver should be used in the next quarterly sampling. However, no attenuation factor should be used when comparing results to WQC.**

Response to Comment: Methods recommended by the EPA contract laboratory program were used for analysis of the metals mercury, nickel, and silver. High levels of sodium and other constituents present in groundwater samples resulted in interferences and thus, the samples required dilution. The dilutions resulted in detection limits in excess of WQC.

The attenuation factor used in the DSR is a conservative estimate in the absence of actual fate and transport data. Fate and transport data will be computed as part of the Phase 7 RI. This fate and transport data will then be used to assess the concentration of contaminants actually reaching the receptors.

Section 12, Site 12, Building 10 (Power Plant)

Specific Comment #1: **During removal of tanks, provide records showing observations in the surrounding soil or ground water, and remediation measures. This is of concern because TPH is being detected consistently at elevated concentrations at several borings. If no records exist, trenching or other appropriate procedures should be performed to determine if any floating products or evidence of extensive contamination exist where the USTs were buried.**

Response to Comment: The fuel oil tanks formerly in use at Site 12 were abandoned in-place, therefore no records of their removal and observations on soil and groundwater quality exist. No evidence of floating product or

extensive contamination was found during the Phases 2B and 3 investigation.

The Navy has prepared a work plan to sample the soil in the vicinity of the tanks. The work plan is dated June, 1991 and is currently under review by the Alameda County Health Department. The work plan specifies ten soil borings in the vicinity of the five USTs. A soil sample will be collected in each boring and floating product will be noted if discovered. This activity is being undertaken as part of the Navy's UST program.

It should be noted that the USTs contained Bunker "C" fuel oil. Bunker "C" oil is extremely viscous. It does not readily flow at room temperature. In fact, normally a system of heating elements is used on tanks and piping to allow the Bunker "C" to be pumped to the boilers.

Specific Comment #2: **Please provide data to support your assertion that the possible source of elevated TPH concentration is the asphalt and base coat material covering the entire area and not the abandoned tanks that used to be filled with fuel oil.**

Response to Comment: TRPH were detected in 19 of 44 soil samples analyzed from Site 12. Of the 19 samples with detectable levels of TRPH, 11 were surface soil samples collected immediately beneath the asphalt surface.

A total of ten borings were drilled at the site. In five of the borings, the only TRPH detected was identified in the surface sample (Borings B12-01, B12-05, B12-06, B12-09, and B12-10). In the remaining five borings, TRPH was identified at depths below the surface sample. However, concentrations detected at depth in these borings were consistently lower (by one order of magnitude) than those detected in surface samples. In addition, the boring installed immediately downgradient of the abandoned USTs (Boring M12-02) contained TRPH at a concentration of 4,020 mg/kg in the surface sample and 44.5 mg/kg in the 10-foot sample.

The distribution of TRPH identified at the site (highest concentrations immediately below asphalt) suggests a surface source for the TRPH. The lower levels detected at depth may be due to naturally occurring hydrocarbons detected by the method used in this investigation (EPA 418.1). In the future, Method 418.1 will not be used. Modified 8015 (both gas and diesel analyses) will be used instead.

Specific Comment #3: **It is apparent that TPH is present all over the site but mostly on the surface. Therefore, a sampling plan should be submitted to define the extent of TPH soil contamination.**

Response to Comment: As discussed in Specific Comment #2 above, we believe the TRPH detected in surface soils are related to the asphalt base coat material and thus, elevated TRPH would be expected to occur over a widespread area in surface soils where asphalt is present. Additional investigation into the extent of TRPH would not lend information on the extent of contamination that may be related to site activities and would not further the goals of the RI/FS.

Section 13, Site 14, Fire Training Area

Specific Comment #1: **DTSC concurs with proposal to lay out a surface grid outside the berm to determine the extent of TPH contamination.**

Response to Comment: This work will be performed as part of the additional work proposed in the DSR for Site 14. The scope of this work will be described in a work plan to be submitted at a later date.

Specific Comment #2: **DTSC concurs with your recommendation on defining the extent of PCB contamination outside the bermed area but also define the extent of dioxin contamination. Compositing samples are not acceptable so discreet samples should be taken instead.**

Response to Comment: This work will be performed as part of the additional work proposed in the DSR for Site 14. The scope of this work will be described in a work plan to be submitted at a later date. No composite samples will be collected.

Specific Comment #3: **Soil samples should be collected around the berm and through the concrete slab and sump to characterize the presence of volatiles.**

Response to Comment: Soil sampling around the berm, through the berm, and in the vicinity of the sump will be conducted with the additional work proposed for Site 14 in the DSR. The scope of work will be described in a work plan to be submitted at a later date.

Specific Comment #4: **Because of the detected benzene in the soil gas survey and other hazardous constituents detected in the unpaved area we think that the exposure pathway for inhalation for this area is complete.**

Response to Comment: We concur that the pathway for inhalation of dust containing constituents detected in unpaved areas is complete. However, since the benzene identified in the soil gas survey appears to be restricted to the area immediately adjacent to, and probably underneath, the concrete pad, we believe that the pathway for inhalation of vapors of volatile constituents is not a concern.

Section 14, Site 15, Buildings 301 and 389 (Transformer Storage Area)

Specific Comment #1: **DTSC concurs with your recommendation to expand the grid to determine the extent of contamination for PCB, pesticides, and semi-volatile organics but also include lead, zinc, and barium which were detected in elevated concentrations in most surface samples.**

Response to Comment: Lead, zinc, and barium will be included in the laboratory analyses for additional samples collected at Site 15.

Specific Comment #2: **DTSC concurs with your recommendation to expand the grid to determine the extent of contamination for PCB, pesticides, and semi-volatile organics but the Navy should also include lead, zinc, and barium which were**

detected at elevated concentrations in most surface samples.

Response to Comment: Specific comment #2 appears to be a repeat of specific comment #1. See response to comment #1, above.

SITE GEOLOGIC AND HYDROGEOLOGIC CHARACTERIZATION

Specific Comment #1: **Submit a plan identifying whether significant vertical ground water flow exists on the site.**

Response to Comment: We interpret "the site" to mean all of the sites studied as part of Phases 2B and 3. It is premature to submit a plan identifying the significance of vertical groundwater flow because the presence and extent of the second water-bearing zone is not known. The head difference between the existing shallow wells and any wells installed after the CPT survey described in Section 5, Site 4 specific comment #3 will be computed to determine local vertical hydraulic gradients.

Specific Comment #2: **Submit a plan to define lithology of the Site beyond the 15 feet level below the surface especially in areas where band of continuous clay layer do not exist unlike several areas at ANAS. The existence and extent of the second water bearing zone must also be define.**

Response to Comment: See response to Section 5, Site 4 specific comment #3 for the approach to the delineation of the potential second water-bearing zone.

Specific Comment #3: **The fence diagram in Site 5 was not consistent with the reading of the boring log. Please verify and submit revised fence diagram.**

Response to Comment: Discrepancies between the boring logs for B05-07 and B05-09 and the fence diagram included as Figure 6-2 have been corrected. A revised fence diagram is included in the Final DSR.

Specific Comment #4: **Boring logs should include the following information:**

a) reference elevation - should state if elevation is above mean sea level;
b) should state ground elevation;
c) should have registered geologist's signature; and
d) under geologic description - indicate grain shape.

Response to Comment:

a) the reference level for all boring logs is the 1929 USGS Mean Lower Low Water datum.
b) the ground elevation is stated on each boring log
c) a registered geologist's signature has been added to all logs
d) this information has not been added to the existing logs because samples are no longer available for observation. In the future, efforts will be made to record this information, where appropriate. However, due to the fine-grained nature of the majority of the material encountered (i.e. very fine to fine grained sands, silty sands, and clays) description of grain shape is generally not feasible.

GROUND WATER TIDAL MIXING STUDY

Specific Comment #1: **Define the extent of seawater intrusion to the inland.**

Response to Comment: Results of the tidal influence study were submitted in the Draft Final Data Summary Report, Background and Tidal Influence Studies and Additional work at Sites 4 and 5 dated August 4, 1992.

Specific Comment #2: **Identify potentiometric levels at highest high tide, lowest low tide, and the net potentiometric levels at each site. Provide ground water contour maps of the above and hydrographs - no more than 5 wells superimposed on the hydrograph of the stilling well (scale: at least 1" - 1 ft; and 0.5 day per time interval or less).**

Response to Comment: For sites with tidal influence, groundwater contour maps at highest high tide, lowest low tide, and for the average head at each well were provided in the Draft Final Data Summary Report, Background and Tidal Influence Studies and Additional work at Sites 4 and 5 dated August 4, 1992. Hydrographs for each included in the tidal influence study were also submitted with this report.

SLUG TEST (HYDRAULIC CONDUCTIVITY)

Specific Comment #1: **Volume 2 of 2 of DSR. There is disagreement on the value for well radius (r_w) of 0.19. If hole diameter is 8.35, calculated r_w should be 0.35 instead of 0.19 unless another value was used. This will throw out all calculations for ln (Re/Rw).**

Response to Comment: All of the wells installed for this study are water table wells (the screened interval straddles the groundwater surface) so a well borehole radius adjustment is required to compensate for water storage in the filter pack (Bouwer and Rice, 1989). The equation used to adjust for the borehole radius is:

$$r_{w\,adj} = [(1-n)r_c^2 + nr_w^2]^{1/2}$$

where:

n = filter pack porosity (assumed to be 0.3)
r_c = radius of well casing
r_w = radius of well (including filter pack)
$r_{w\,adj}$ = adjusted radius of well (including filter pack)

Text explaining the slug test procedures, mathematical procedures, and the computer program output is now included in Appendix C. The Bouwer and Rice article and Bouwer's update are also included in Appendix C.

Specific Comment #2: **Data indicated that Log (Re/Rw) was used instead of ln (Re/Rw), please verify calculation.**

Response to Comment: Log (R_e/R_w) is a typographical error in the computer printout. The program actually computes and uses ln(R_e/R_w).

Specific Comment #3: **Please address numbers 1 and 2 above and recalculate hydraulic conductivity and resubmit the whole appendix (amendment). However, this time show all formulas and calculations. It is not necessary to revise the hydraulic conductivity quoted in each site in volume 1 of the DSR.**

Response to Comment: As described in responses to specific comments #1 and #2, the calculations submitted in the original appendix are correct and do not need to be recalculated. However, the appendix will be re-issued with the text described in the response to specific comment #1.

QUALITY CONTROL/QUALITY ASSURANCE

Specific Comment #1: **All detection limits should be below the WQC and MCL. If they are exceeded, explanations or justifications should be provided.**

Response to Comment: Detection limits vary due to sample dilution. Dilutions are required when an analyte or compound is found at a concentration that is above quantitation limits for the analytical procedure. The sample is then diluted to bring the concentration within method control limits. The detection limit is multiplied by the dilution factor. The laboratory properly applied the methodology during this project. The high detection limits are the result of method as applied to the matrices found at NAS Alameda.

Specific Comment #2: **In the future, explanations should be provided why data are rejected and why it need not be replaced by reanalyzing samples.**

Response to Comment: Detailed explanations for all data qualifications, including rejected data, are found in Section 2 of the Quality Control Summary Report (QCSR). Due to the volume of data it is not feasible to include the detailed explanation in both the DSR and QCSR.

We believe the rejected data need not be replaced because the Data Quality Objective (DQO) of 90% completeness has been met. DQOs are defined in the EPA Region 9 Guidance for Preparing Quality Assurance Project Plans for Superfund Remedial Projects document dated September, 1989. However, in all cases where data was rejected due to laboratory or field collection error (i.e. missed holding time, broken extraction vials, etc.) the samples were recollected and reanalyzed (see Quality Control/Quality Assurance specific comment #3).

Specific Comment #3: **There are some sample locations that showed NA (Not Analyzed). Please provide explanations why they were not analyzed or why they need not be resampled. Otherwise these sample locations should be resampled and analyzed as part of the next sampling investigations.**

Response to Comment: There are several reasons that samples may appear on the hits only data tables as "NA." The most common reason is VOC analyses were not performed on surface soil samples, per the DTSC-approved work plan. Therefore, an "NA" appears in place of VOC results for surface soil samples.

Another reason an "NA" may appear is that duplicates were collected and analyzed for 10% of the samples by analysis and the analyte list varies by site. This means that not all duplicates were analyzed for each parameter that its parent sample was analyzed. An "NA" appears in place of the results for the parameters for which the duplicate sample was not analyzed.

The third reason that "NA" appears in the data tables is that water temperature data was not collected on a small number of groundwater samples (M05-02, 03, 05; W-1, W-2; and 7B-01 and 7B-01 duplicate).

The last reason that an "NA" will appear in a data table is because of a missed holding time or other laboratory error. In each case the sample was recollected and the laboratory analyzed for the parameter in question. The resample data is always in the column directly to the right of the original sample (see samples B-05-01-003, B08-04-008, B15-02-000, and M14-03). Resamples were only analyzed for the parameters missed in the original sample, therefore "NA" is recorded for the other parameters.

SUBMITTAL OF RESPONSE

Specific Comment #1: **ANAS does not need to resubmit the draft Data Summary Report. A separate document can be submitted to address comments.**

Response to Comment: The Data Summary Report will be resubmitted as a Final version. This response to comments is included as an additional section.

Specific Comment #2: **All submittals relating to workplans on future investigations of soil and ground water should be submitted within thirty (30) days from the date of this letter.**

Response to Comment: This schedule cannot be met due to Navy contracting requirements. The Navy is currently preparing work authorizations to prepare the work plans. A more definite schedule will be provided to DTSC when the contracting procedure is completed. However, Navy will submit all work plans before the end of January, 1993.

Specific Comment #3: **The rest of submittals should be submitted within sixty (60) days from the date of this letter except for the Baseline Risk Assessment and Preliminary Remedial Action Alternative documents.**

The Baseline Risk Assessment and the Preliminary Remedial Action Alternative documents should be submitted at staggered schedule (e.g., at least no more than four sites every thirty days) no later that ninety (90) days from September 30, 1992.

Response to Comment: See response to General Comment #8.

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FINAL
DATA SUMMARY REPORT
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
PHASES 2B AND 3

DATED 27 OCTOBER 1992

THIS RECORD CONTAINS MULTIPLE VOLUMES
WHICH HAVE BEEN ENTERED SEPARATELY

VOLUME 2 OF 2 IS ENTERED IN THE DATABASE
AND FILED AT ADMINISTRATIVE RECORD NO.
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